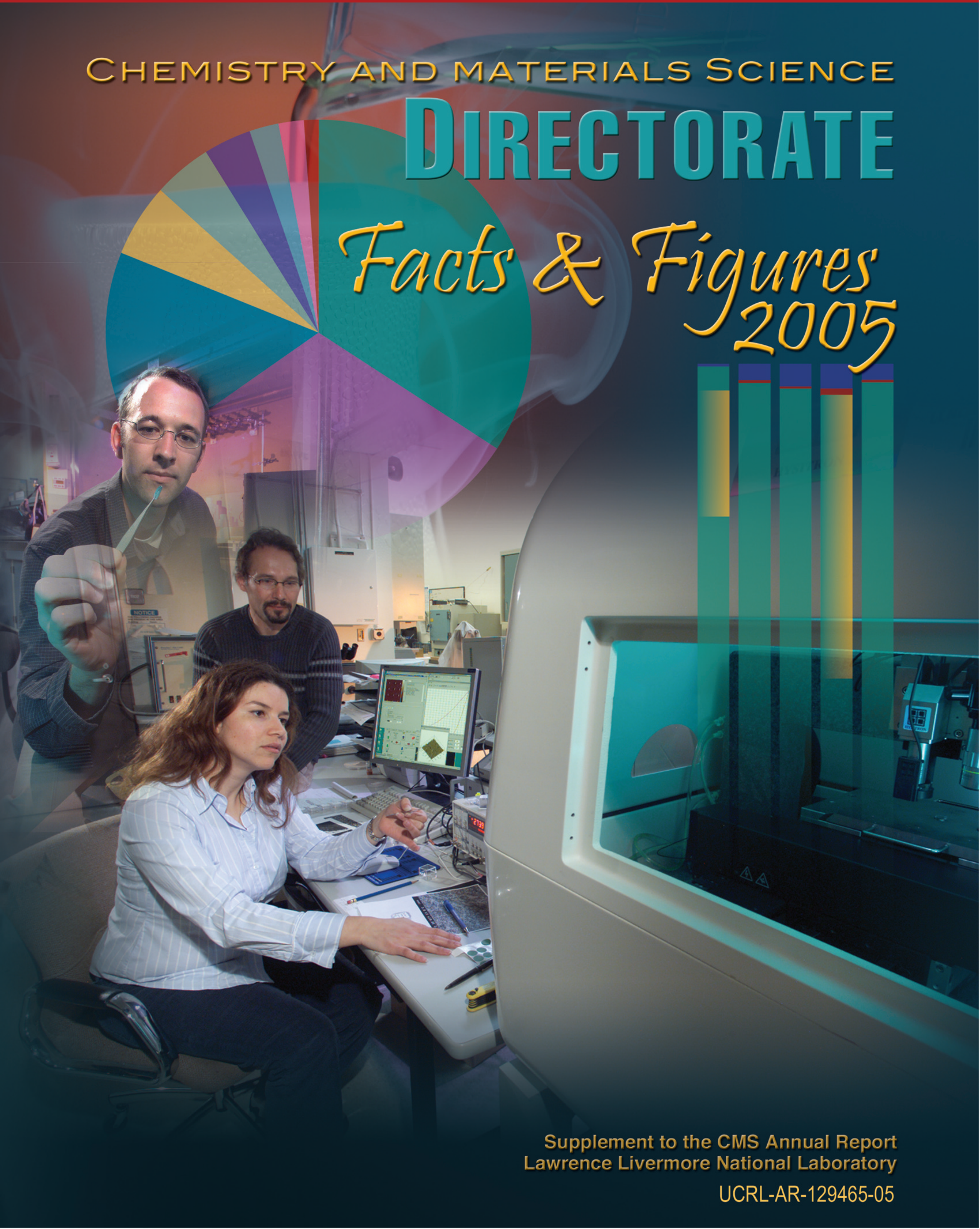
Chemistry and Materials Science Directorate

Facts & Figures 2005



Supplement to the CMS Annual Report
Lawrence Livermore National Laboratory

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Available electronically at http://www-cms.llnl.gov/facts_figures_05.pdf

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LAWRENCE LIVERMORE NATIONAL LABORATORY

May 2005

UCRL-AR-129465-05

Chemistry and Materials Science Directorate

Facts & Figures 2005

May 2005
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Message from Tomás Díaz de la Rubia

As the Associate Director for Chemistry and Materials Science (CMS), I would like to welcome new readers and long-time readers to this publication. *Facts & Figures* has evolved over the years to keep pace with the growth of CMS. The title of this publication reflects its origins and intent to be a broad overview of budgetary, personnel, and other administrative information about Lawrence Livermore National Laboratory (LLNL) and our directorate. This publication is a companion and supplement to our science and technology annual report.

The Laboratory is 52 years old, and since it's inception, Chemistry, as a discipline, has been identified as a separate organization. I am proud to be a part of a dynamic team and look forward to a very exciting but challenging 2005. It is our tradition of excellence in meeting the demands of the Laboratory and in anticipating its future needs through innovations in science and technology that position us to be an essential part of meeting the challenges and opportunities of the future.

Regards,

Tomás

2004 at a Glance

The Laboratory Workforce
6,780 career employees, 1,057 term appointments, 149 postdoctoral researchers, 756 noncareer employees, and 914 other non-LLNL laborers.

Laboratory Organization
Director; Deputy Director Science and Technology; Laboratory Executive Officer; Deputy Director Operations; Defense and Nuclear Technologies (DNT); National Ignition Facility (NIF) Programs; Nonproliferation, Arms Control, and International Security (NAI); Homeland Security; Energy and Environment (E&E); Physics and Advanced Technologies (PAT); Biology and Biotechnology Research Program (BBRP); CMS; Engineering (Eng); Computation (Comp); Safety and Environmental Protection (SEP); Administration and Human Resources (AHRD); and Laboratory Services (LSD).

Laboratory Operating Costs
$1,453.6 million

Laboratory Full-Time Equivalents
7,713

Chemistry and Materials Science Workforce
359 career employees, 79 term appointments, 39 postdoctoral researchers, 49 noncareer employees, and 10 other non-LLNL laborers

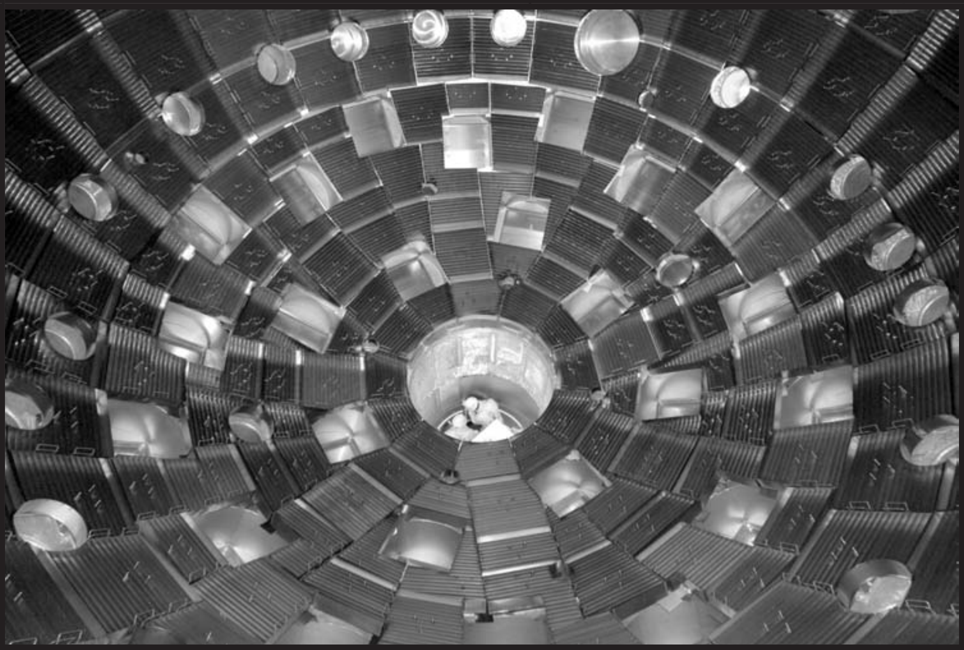
CMS Organization
Associate Director (AD); principal deputy AD; deputy AD for Operations; deputy AD for Science and Technology; assurance manager; chief financial officer and facility director, Chemical Biology and Nuclear Science division leader; Chemistry and Chemical Engineering Division leader; Materials Science and Technology Division leader; material program leaders for DNT, NIF, and NAI/Department of Defense (DoD); Glenn T. Seaborg Institute for Transactinium Science; Nanoscale Synthesis and Characterization Laboratory; BioSecurity and Nanosciences Laboratory; and Forensic Science Center.

CMS Operating Costs
$59.3 million

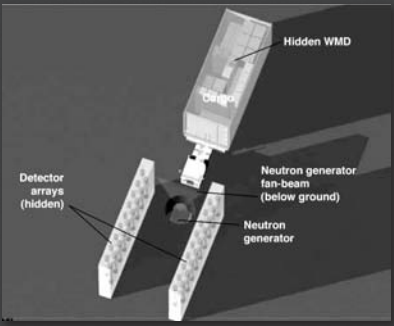
CMS Full-Time Equivalents
421

Lawrence Livermore National Laboratory

Facts & Figures



From top left: scientists Nick Tesclich and Mark Wall working on a dual beam focused ion beam. Top right: NIF target chamber showing first wall panels used to protect the interior from debris, shrapnel, and neutrons. Bottom left: aerial photograph of the Livermore site. Bottom center: device created by LLNL's Homeland Security Organization to test incoming cargo containers. Bottom right: LLNL's new Terascale Computing Facility. CMS will use the computers to be housed there for theory, simulation, and modeling projects.



Facts and Figures—Lawrence Livermore National Laboratory

History

The Laboratory was established in 1952 to meet an urgent national security need by helping to advance nuclear weapons science and technology. At Berkeley, Ernest O. Lawrence had created the model of how large-scale science should be pursued—through multidisciplinary team efforts. Lawrence and Edward Teller argued for the creation of a second laboratory to augment the efforts of Los Alamos. Activities began at Livermore under the aegis of University of California (UC) with a commitment by our first director, Herbert York, to follow Lawrence's team-science approach and be a "new ideas" laboratory. Since then, with support principally from the Department of Energy (DOE) and its predecessors, Livermore has been making history and making a difference.

In the 1950s, Livermore made its first major breakthrough—the design of a megaton-class warhead for missiles that could be launched from highly survivable submarines. We went on to develop the first high-yield warheads compact enough that several could be carried on each ballistic missile. More recently, we successfully completed a life-extension program to keep the nation's most modern warhead, the W87, part of the U.S. strategic arsenal well into the 21st century. Also, when the Laboratory opened, we started to explore the feasibility of civilian fusion energy. That quest will come one step closer to fruition through future experiments in NIF.

In the 1960s, our exploration of the peaceful use of nuclear explosives spawned bioscience and environmental programs at Livermore. Biotechnology developments at Livermore and Los Alamos, such as chromosome biomarkers and high-speed-cell sorters, enabled the DOE to launch its Human Genome Initiative in 1987. That initiative grew to become an international endeavor that completed sequencing the human genome in 2000. Our bioscience programs are now also contributing to national efforts to combat the threat of bioterrorism. Environmental programs have led to novel groundwater remediation technologies in use at Superfund sites, models that are contributing to understanding the human impact on global climate change, and the establishment of the National Atmospheric Release Advisory Capability (NARAC) at Livermore. NARAC contributes to emergency response decisions after release of radioactivity or toxic materials, such as the Three Mile Island and Chernobyl events.

In the 1970s, Livermore began a laser research program, and the Laboratory has been at the forefront of laser science and technology ever since. A sequence of ever-larger lasers to explore inertial confinement fusion has led to construction of NIF, which will provide essential support to our national security mission. Like its predecessors, NIF will enable new scientific discoveries and is stimulating the development of new products and processes in U.S. industry. The energy crisis in the 1970s invigorated energy research programs at the Laboratory, which are part of the government–industry partnership to develop long-term reliable, affordable, clean sources of energy.

In the late 1980s, Livermore researchers began to explore the feasibility of using multiple parallel processors for scientific computing. For five decades, the need for ever more powerful simulations for nuclear weapons design has guided industry's development of supercomputers. Livermore frequently has been home to the most advanced computers in the world, and we have helped industry make prototype machines ready for a wider range of users. Now, multiple parallel processing is central to the Advanced Simulation and Computing (ASC) Program, which is a key component of efforts to maintain the nation's nuclear weapons stockpile. Terascale computing is also offering unprecedented opportunities for scientific discovery.

In the 1990s, the Laboratory helped DOE to define the Stockpile Stewardship Program, which is ensuring the safety, security, and reliability of the nation's nuclear deterrent as weapons continue to age. We are a key participant in the program and home to unique capabilities for the effort, such as the ASC supercomputers and NIF. In addition, concerned about the prospect of proliferation, Livermore established

NAI in 1991 to focus analysis efforts and technology development to deal with what was then an emerging threat—use of weapons of mass destruction by terrorists or a nation state.

As the Laboratory enters its second half-century, our focus remains as clear as it was on the first day in 1952—ensuring our country's national security through scientific research and engineering development, responding to new threats in our ever-changing world, and developing new technology that will benefit people everywhere. "Making history, making a difference" was the theme of our golden anniversary celebrations, and it will be the Laboratory's continuing course for its next 50 years.

Mission

LLNL is a premier research and development institution for science and technology applied to national security. We are responsible for ensuring that the nation's nuclear weapons remain safe, secure, and reliable. LLNL also applies its expertise to prevent the spread and use of weapons of mass destruction and to strengthen homeland security.

Our national security mission requires special multidisciplinary capabilities that are also used to pursue programs in advanced defense technologies, energy, environment, biosciences, and basic science to meet important national needs. These activities enhance the competencies needed for our defining national security mission.

The Laboratory serves as a resource to the U.S. Government and is a partner with industry and academia. Safe, secure, and efficient operations and scientific and technical excellence in our programs are necessary to sustain public trust in the Laboratory.

Vision and Goals

The Laboratory's goal is to apply the best science and technology (S&T) to enhance the security and well-being of the nation and to make the world a safer place.

Organization

LLNL is managed and operated by UC for DOE. The Laboratory director and his senior management team are appointed by the UC Board of Regents.

The director is supported by two deputies and the Laboratory executive officer—key functions that report directly to him—and associate directors that lead major organizations responsible for LLNL programs, supporting scientific capabilities, and Laboratory operations (see Figure 1).

Figure 1. LLNL Organization Chart

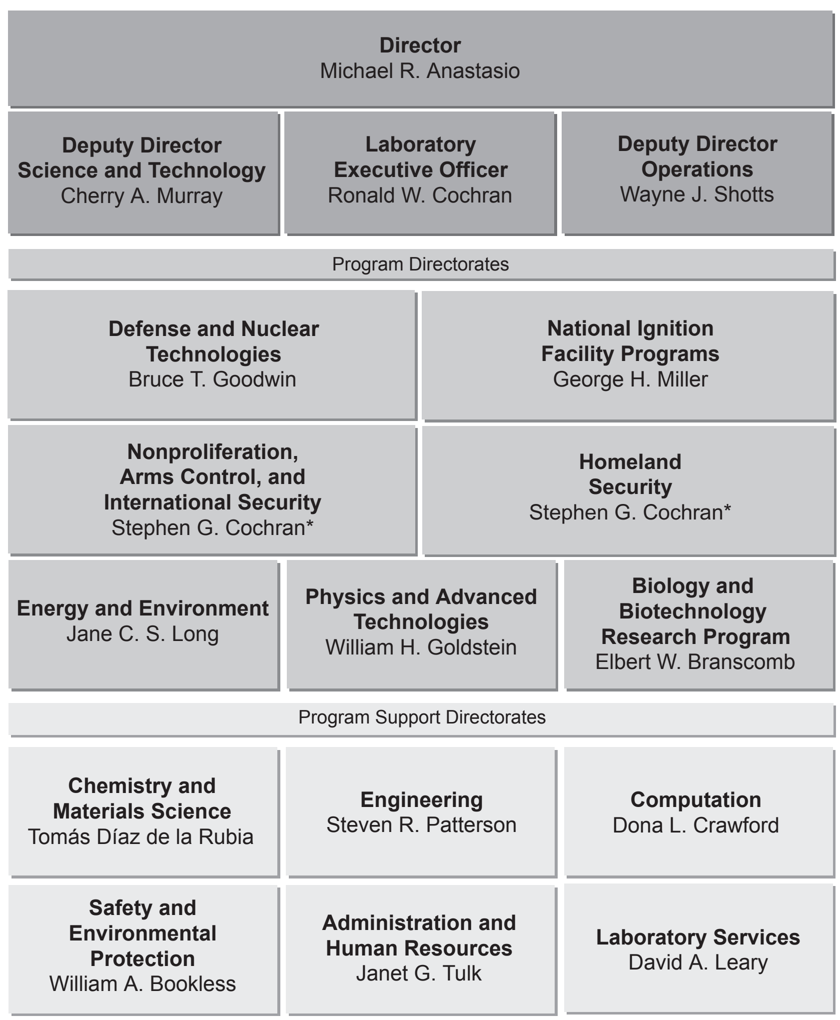


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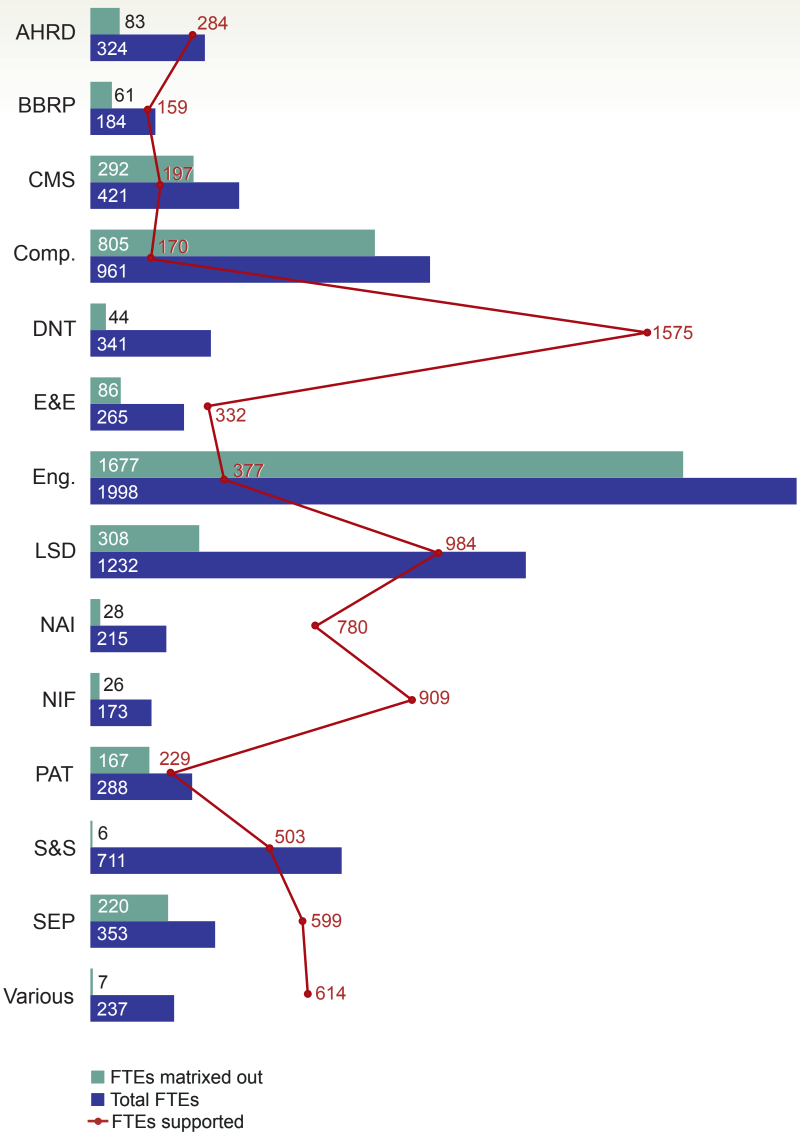
Figure 2. LLNL Organization Matrix



Operations

Laboratory programs are supported by a large technical base consisting of more than 1,700 PhD scientists and engineers. A significant portion of the scientific staff is organized into disciplines or support directorates—CMS, Computation, and Engineering—and many of these people are matrixed, or assigned, to specific programs within other directorates. Use of the matrix system fosters the efficient transfer of technical knowledge among programs, enables staff members to develop a wide-ranging set of skills and knowledge, and infuses projects with diverse ideas for solutions. As a result, the Laboratory has the ability to seize program opportunities, the agility to react quickly to technical surprises, and the flexibility to respond to programmatic changes. Figure 2 and Table 1 show the total number of full-time equivalents (FTEs) and the mix of FTEs supported by each organization as well as the percentages of Laboratory employees matrixed out to different directorates. FTE is a term used to describe a full-time employee who, during the course of a year, takes an average amount of vacation, sick leave, and other leave in addition to normal holiday leave.

Table 1. Percentage and Number of Matrixed Employees

	Percent Matrixed Out	AHRD	BBRP	CMS	Comp.	DNT	E&E	Eng.	LSD	NAI	NIF	PAT	SEP	S&S	Various	FTEs Supported	FTEs Matrixed In
AHRD	26%	240.1	0.1	2.0	8.8	-	1.4	9.3	11.6	2.3	3.8	1.3	3.3	-	0.5	284.3	44
BBRP	33%	1.6	122.7	2.1	21.4	-	0.8	3.9	1.7	-	-	-	4.6	-	0.5	159.2	36
CMS	70%	3.0	1.3	127.9	17.6	0.4	1.0	18.8	1.2	0.5	1.4	3.4	20.0	-	0.1	196.6	69
Comp.	84%	1.2	0.8	0.2	155.9	-	-	8.4	1.2	-	-	0.2	1.8	-	-	169.8	14
DNT	13%	17.6	-	133.0	273.2	297.3	19.7	644.8	22.9	12.1	2.9	90.4	59.4	2.0	0.1	1,575.3	1,278
E&E	32%	4.1	2.0	31.7	58.2	0.1	178.9	44.1	2.6	0.2	-	0.8	9.1	-	0.1	332.0	153
Eng.	84%	5.0	0.1	1.8	24.8	0.2	0.3	321.4	8.0	0.2	0.4	0.5	14.3	0.1	-	377.4	56
LSD	25%	2.5	-	0.7	8.3	-	-	12.5	924.1	-	0.2	-	34.1	1.7	-	984.2	60
NAI	12%	9.5	35.5	55.0	137.5	7.2	44.2	219.2	12.6	197.8	1.2	33.0	24.3	0.7	2.7	780.4	583
NIF	15%	10.9	-	34.4	90.5	16.6	0.2	519.9	54.6	0.6	147.1	13.8	19.2	0.1	1.5	909.3	762
PAT	58%	1.9	0.4	4.8	13.3	3.1	0.1	73.2	0.6	0.1	1.9	120.7	8.4	-	-	228.5	108
S&S	2%	2.7	-	0.9	61.1	13.2	0.2	49.0	21.1	0.2	0.6	-	6.4	346.6	1.5	503.3	157
SEP	31%	14.9	0.7	12.0	29.9	0.1	4.1	32.3	9.3	-	2.5	0.9	491.1	1.3	0.1	599.0	108
Various	3%	8.4	20.3	14.1	60.1	3.0	13.7	41.9	160.2	12.0	11.0	22.7	15.2	0.2	230.8	613.6	383
Totals		323.5	184.0	420.5	960.5	341.2	264.6	1,998.4	1,231.7	225.9	173.1	287.7	711.4	352.7	237.8	7,712.8	3,810

Minor variances may occur due to rounding.
See Acronyms and Abbreviations on page 39 for full names of organizations.
September 30, 2004.

Financial and Full-Time-Equivalent Highlights

LLNL's operating and capital expenses totaled $1,631 million for the fiscal year (FY) ending on September 30, 2004. This included $1,454 million for Laboratory operating budgets and $177 million for capital projects. FY05 operating and capital budgets are projected to be $1,654 million. The Laboratory's institutional and distributed costs in FY04 totaled $812 million. The staffing level as of September 30, 2004, was 7,713 FTEs, including full-time, part-time, and indeterminate-time employees. As of October 6, 2004, there are 7,678 planned FTEs. (See Table 2 for the breakdown of financial and FTE information by major program.) Part-time employees are counted as fractional FTEs; therefore, FTE totals are not equivalent to the number of employees.

Figures 3 and 4 show the operating costs and FTEs from FY00 to FY04.

Staffing and Demographics

As of September 30, 2004, the LLNL workforce numbered 9,656. This workforce is composed of 70% career employees, 11% term appointments, 2% postdoctoral researchers, 8% noncareer employees (including temporary, student, faculty, retiree, and miscellaneous employees), and 9% supplemental laborers (see Figure 5 and Table 3). According to the staff profile of indefinite employees, 42% are scientific staff, 20% are administrative and clerical personnel, and 39% are technical and crafts personnel. About 47% of the scientists and engineers have PhDs. For a listing of staff by degree composition and job title, see Figure 6 and Table 4.

Table 2. Laboratory Costs and FTEs by Major Program

Major Program	FY04 Actual 9/30/04 $M	FY04 Actual 9/30/04 FTEs	FY05 Planned 10/6/04 $M	FY05 Planned 10/6/04 FTEs
Operating Costs				
National Nuclear Security Administration (NNSA)	967.3	2,410	**1,004.1**	**2,488**
DOE Direct	134.7	423	**144.2**	**445**
Homeland Security	77.5	173	**98.5**	**242**
Work for DOE/Integrated Contractor	79.2	193	**34.6**	**88**
Non-DOE	184.2	385	**219.0**	**460**
Noncontract Costs	10.8	17	**9.0**	**14**
Total Sponsor-Funded Operating Costs	1,453.6	3,600	**1,509.5**	**3,736**
Capital Costs				
NNSA Construction	174.1	266	**143.1**	**153**
DOE Construction	3.0	-	**1.7**	
Total Sponsor-Funded Capital Costs	177.0	266	**144.8**	**153**
Total Sponsor-Funded Operating and Capital Costs	1,630.7	3,866	**1,654.3**	**3,889**
Distributed Costs				
Laboratory-Directed Research and Development	69.8	264	**66.0**	**259**
Plant Engineering Jobs	-	-	**-**	**456**
Distributed Service Center	150.9	508	**167.7**	**438**
Organization Facility Charge	103.4	429	**108.7**	**308**
Organization Personnel Charge	116.2	309	**119.3**	**689**
Program Management Charge	68.0	679	**73.0**	**371**
Institutional General Purpose Equipment	10.1	377	**3.9**	**1**
Institutional General Plant Projects	6.5	10	**6.5**	**-**
General and Administration	287.3	1,271	**259.3**	**1,267**
Total Distributed Costs	812.2	3,847	**804.5**	**3,789**
Total Operating, Capital, and Distributed Costs	2,442.9	7,713	**2,458.8**	**7,678**

Minor variances may occur due to rounding.
$M = millions of dollars.

Figure 3. Laboratory Operating Costs during the Past Five Years

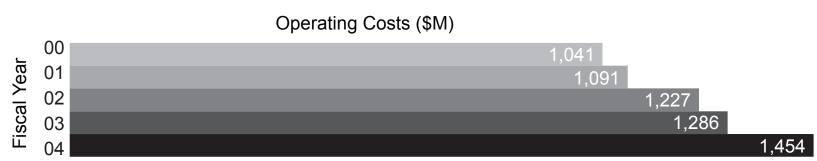


Figure 4. Number of Laboratory FTEs during the Past Five Years

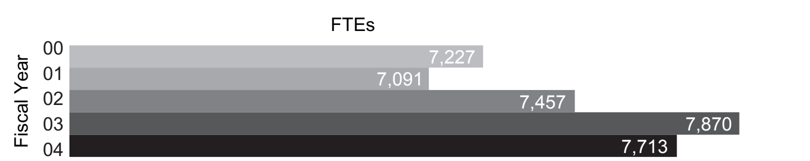


Figure 5. Five-Year Population Distribution by Workforce Status

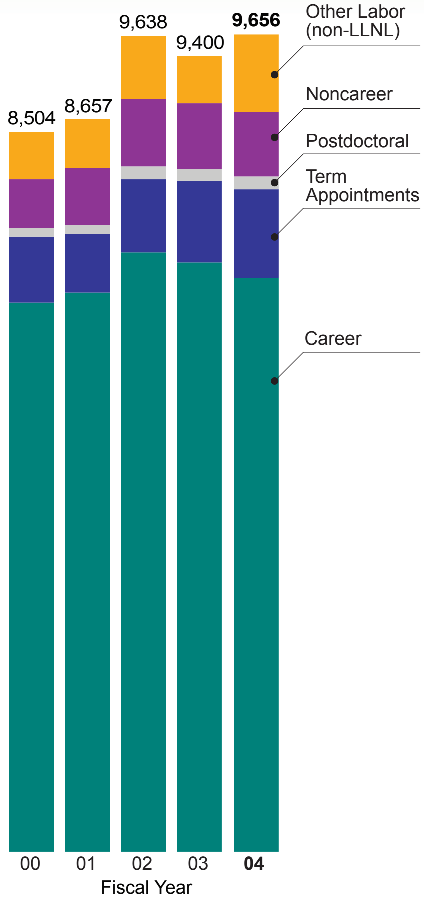


Table 3. LLNL Workforce

Workforce Category	FY00	FY01	FY02	FY03	FY04
Career Employees	6,488	6,613	7,081	6,961	**6,780**
Term Appointments	788	687	874	964	**1,057**
Postdoctoral Researchers	104	103	142	145	**149**
Noncareer Employees	565	687	796	776	**756**
Other Labor (non-LLNL)	559	567	745	554	**914**
Total Laboratory Workforce	8,504	8,657	9,638	9,400	**9,656**

Figure 6. LLNL Staff Profile by Degree Composition

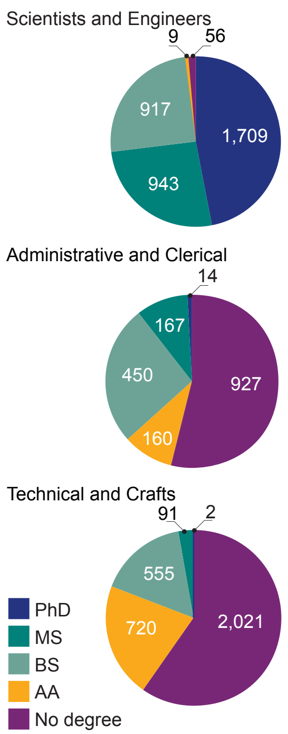


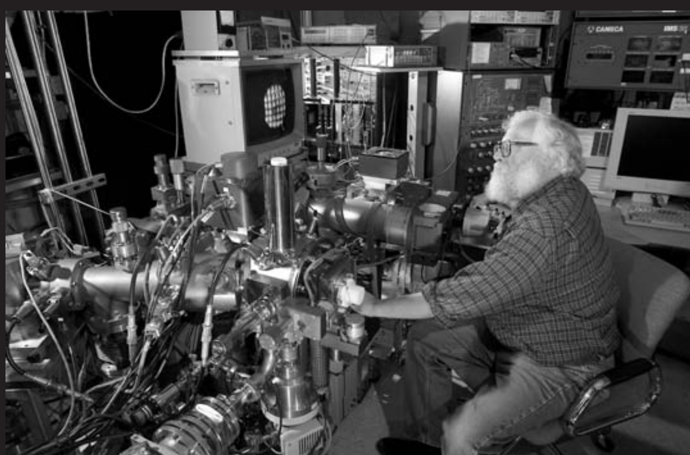
Table 4. LLNL Staff Profile by Job Title and Degree Composition

Job Title	PhD	MS	BS	AA	No Degree	Total	Staff%
Scientists and Engineers							
Physicists (270)	807	102	38	1	2	950	11%
Chemists (242)	176	47	65	-	2	290	3%
Engineers/Patent Engineers (168, 249)	304	457	322	2	17	1,102	13%
Mathematicians/Computer Scientists (256, 285)	134	237	375	4	31	781	9%
Biological Scientists (225, 277, 235, 228, 221, 220)	197	26	70	1	4	298	3%
Environmental Scientists (230, 235)	32	44	39	-	-	115	1%
Metallurgists (265)	39	12	5	1	-	57	1%
Medical Doctors (Staff) (263)	1	7	-	-	-	8	-
Political Scientists (295)	11	10	3	-	-	24	-
Faculty Scholars (297)	8	1	-	-	-	9	-
Total Scientists and Engineers	1,709	943	917	9	56	3,634	42%
Administrative and Clerical							
Management (170,175,196, 197)	8	55	45	4	17	129	1%
Professional (163–165, 169, 170)	-	-	1	-	3	4	-
Administrative (100–162)	6	109	330	73	325	843	10%
Clerical/General Services (400–462)	0	3	74	83	582	742	8%
Total Administrative and Clerical	14	167	450	160	927	1,718	20%
Technical and Crafts							
Security/Fire Department (051, 055, 650–656)	0	1	32	47	233	313	4%
Technical (302–339, 393, 347–391, 502–588, 593)	1	41	400	603	1,077	2,122	24%
Trades (722–799, 805–990)	1	49	123	70	701	944	11%
Total Technical and Crafts	2	91	555	720	2,011	3,379	39%
Total Laboratory Staff	1,725	1,201	1,922	889	2,994	8,731	100%
Degree Composition Percent	20%	14%	22%	10%	34%	100%	

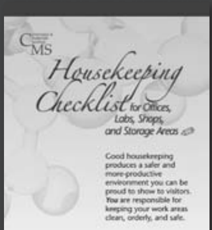
Numbers in parentheses are job classifications.

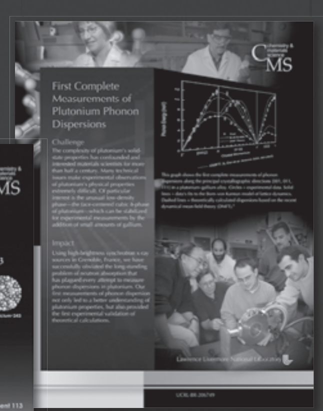
Chemistry and Materials Science

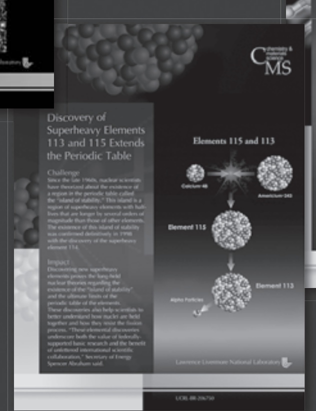
Facts & Figures



From top left: Scientist Art Nelson aligns a laser heating beam for our time-resolved x-ray laser induced time-of-flight photoelectron spectroscopy. The COMET x-ray laser is in the background. Middle left: Scientist Roger Qiu using in situ atomic force microscopy to investigate which therapeutic agents and proteins control the formation of kidney stones. Top right: scientist Doug Phinney tuning an ion microprobe used to measure isotopic compositions and trace-element concentrations of microstructures in solids. Bottom left: CMS' newest building, completed this year. Bottom right: CMS' Housekeeping Checklist describes how to have a safer and more productive environment. Next: new fact sheets with the following titles: *Molecular Dynamics Simulations Unveil Unprecedented Details of Water-Air Interface, Dynamic Microscopy at the Nanoscale,* and *First Complete Measurements of Plutonium Phonon Dispersions*.







Facts and Figures—Chemistry and Materials Science

History

Since LLNL's inception in 1952, Chemistry, as a discipline, has been identified as a separate organization. It has been called the Chemistry Group, the Chemistry Division, the Chemistry Department, the Chemistry and Materials Science Department, and since 1985, the Chemistry and Materials Science Directorate. Table 5 outlines the major changes in the Chemistry organization since 1952.

Research Themes

Four research themes define the CMS Directorate's work and unite the staff in a set of common goals:

1. Materials properties and performance under extreme conditions—CMS investigates the properties and performance of metals (e.g., plutonium, tantalum, copper, iron, and tin) under extreme conditions of shock, pressure, stress, temperature, and strain rate, and also studies quantum-confinement and surface-passivation effects in nanomaterials.
2. Chemistry under extreme conditions and chemical engineering in support of national-security programs—CMS looks for insights into the chemical reactions of energetic materials in the nuclear stockpile through models of molecular response to extreme conditions (e.g., quantum effects in chemical systems and energetic-material response during detonation) and for new techniques for processing energetic materials by using sol-gel chemistry.

Table 5. Chronological History of CMS Directorate Management from 1952 to the Present

Year	CMS Directorate Management
1952	The Chemistry Group—50 of the Laboratory's 308 full-time equivalents—reports to E. O. Lawrence through Herb York. Ken Street, Chemistry department head.
1953	Roger Batzel, assistant department head of Chemistry.
1956	Ken Street, Chemistry division leader.
1957	Ken Street, AD of Chemistry.
1959	Ken Street goes to UC Berkeley (he returns to Livermore in 1974 as the Energy Programs AD). The Chemistry Division, under Roger Batzel, reports to Edward Teller.
1961	Roger Batzel, Chemistry AD and acting AD for the Test Directorate (remains department head).
1966	Roger Batzel, Chemistry and Space Reactor Program AD.
1967	Gus Dorough, Chemistry Department head.
1969	Roger Batzel, Chemistry and Biomedical Research AD.
1971	Roger Batzel, LLNL Director. James Kane, Chemistry Department head.
1973	Gus Dorough, AD for Scientific Support (which included Chemistry and Computation). The Chemistry Department becomes the Chemistry and Materials Science Department.
1974	James Kane goes to Washington as technical assistant to the general manager, Atomic Energy Commission. (He later became the head of Energy Research. In 1985, Kane was appointed as the special assistant for Laboratory Affairs, UC Office of the President, under Senior Vice-President Bill Frazer.) Jack Frazer, Chemistry Department head.
1977	The Radiochemistry Division moves to the Nuclear Test Directorate and is renamed the Nuclear Chemistry Division under Chris Gatrousis.
1978	Charles Bender, Chemistry Department head.
1982	Ken Street, Acting AD for Chemistry and Computation.
1983	Computation separates from Chemistry, with Bob Borchers as the Computation AD.
1985	Chris Gatrousis, AD for CMS.
1994	Jeff Wadsworth, AD for CMS. The Nuclear Chemistry Division rejoins the CMS Directorate.
1996	Larry Newkirk, acting AD for CMS.
1997	Hal Graboske, AD for CMS.
2002	Tomás Díaz de la Rubia, AD for CMS.

3. Science in support of national objectives at the intersection of chemistry, materials science, and biology—CMS performs multidisciplinary research that supports national objectives by developing new technologies (e.g., carbon nanotube arrays, multiscale computational models, scanning probe nanolithography, and bioaerosol mass spectrometry) to combat chemical terrorism and bioterrorism, to monitor changes in the nation's nuclear stockpile, and to enable the development of advanced new methodologies for fundamental biology studies and human health applications.
4. Applied nuclear science for human health and national security—CMS performs nuclear science research that is being used to develop new methods and technologies for detecting nuclear materials, improving the treatment of advanced cancer, and assisting Laboratory programs that require nuclear and radiochemical expertise in carrying out their missions.

Operations

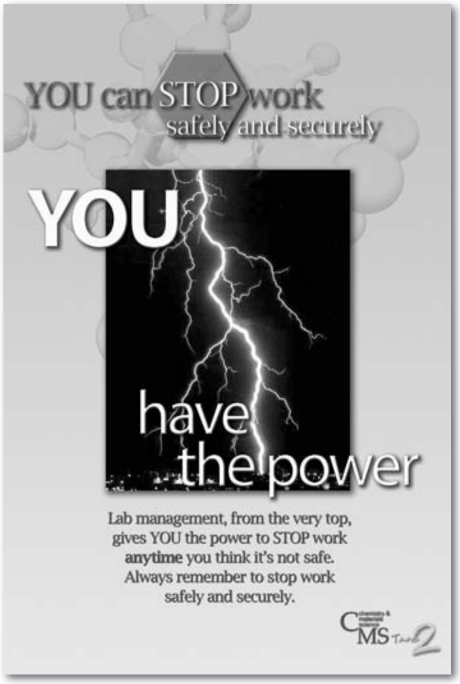
The scientific and technical discipline activities of the CMS Directorate can be divided into three broad categories:

1. CMS staff assigned to work directly in a program—a matrix assignment typically involving short deadlines and critical time schedules.
2. The development, management, and delivery of analytical, characterization, measurement, synthesis, processing, and computing capabilities and scientific services to the programs.
3. Longer-term research and development (R&D) activities in technologies important to the programs, determining the focus and direction of technology-based work on programmatic needs.

Integrated Safety Management System

CMS applies Livermore's Integrated Safety Management System (ISMS) to incorporate quality assurance and environment, safety, and health (ES&H) requirements into CMS research and work activities. The focus of ISMS is to provide resources to our scientists and employees to support the accomplishment of research or work activities in ways that fulfill the ES&H requirement to do work safely.

To achieve ISMS goals, CMS provides safety officers and ES&H Team 5 as support to our researchers. These resources help researchers complete the Integration Work Sheet process to identify ES&H requirements early, when planning their work. This process results in improved project planning and, ultimately, fewer ES&H concerns and better budget estimates.



CMS' goal is zero injuries.

Another strong component of ISMS is CMS' facility safety committees, which operate in each CMS-managed facility. These committees enable workers to assist in resolving safety issues that affect research and work activities in the CMS Directorate's facilities.

While we continue to seek feedback for continuous improvement, our ISMS has helped us to better define line management's responsibility for work activities and has increased worker involvement in and awareness of safety.

Mission

The mission of the CMS Directorate is to enable the Laboratory to accomplish its primary missions through excellence in the chemical and materials sciences.

Vision

The CMS Directorate's vision is to be known as the premier provider of scientific leadership that anticipates and meets the needs of Laboratory programs, is recognized as a national leader in the chemical and materials sciences, and has an exceptional and safe work environment that attracts and retains a vital and diverse workforce.

Strategic Goals

The CMS Directorate's strategic goals are:

- Delivering on our commitments and enhancing our intellectual leadership in key areas of the Laboratory.
- Excelling in science that ensures program success in responding to national missions.
- Performing science and technology of nationally recognized excellence.
- Developing and maintaining a high-quality diverse workforce that serves the needs of the Laboratory.

Organization

Figure 7 shows the current CMS organization, which includes the leaders of the following:

- Infrastructure activities and functions that span the directorate:
  - — Administration.
  - — Materials Program Leaders (MPLs).
  - — Chief Scientist and Chief Technologist.
  - — Personnel.
  - — Assurance oversight.
  - — Operations.
  - — Financial management.
  - — S&T communications.
  - — Facility management.
  - — R&D portfolio management.
  - — Safety.
  - — Security.
  - — Computer support.
- Divisions that support the following organizing themes:
  - — Chemical Biology and Nuclear Science Division (CBND)—Science supporting national objectives at the intersection of chemistry, materials science, and biology; also applied nuclear science for human health and national security.
  - — Chemistry and Chemical Engineering Division (CChED)—Chemistry under extreme conditions and chemical engineering to support national security programs.
  - — Materials Science and Technology Division (MSTD)—Materials properties and performance under extreme conditions.
- Institutes and centers that provide strong interdirectorate collaborations, strong connections to UC, and a window to the world:
  - — Glenn T. Seaborg Institute for Transactinium Science (GTSI).
  - — BioSecurity and Nanosciences Laboratory (BSNL).
  - — Forensic Science Center (FSC).
  - — Nanoscale Synthesis and Characterization Laboratory (NSCL).

Organization charts for CBND, CChED, MSTD, and the Finance and Facilities Office are included at the end of this document on pages 34–37.

Directorate Awards

CMS uses the Directorate Awards and Spot Awards programs to recognize one-time achievements that have notable impact on the CMS Directorate and/or that contribute to the pursuit of excellence at LLNL. CMS awards are given in the following categories:

- Scientific/technical.
- ES&H.
- Leadership.
- Operations and administration.
- Institutional impact.

Award Types and Criteria

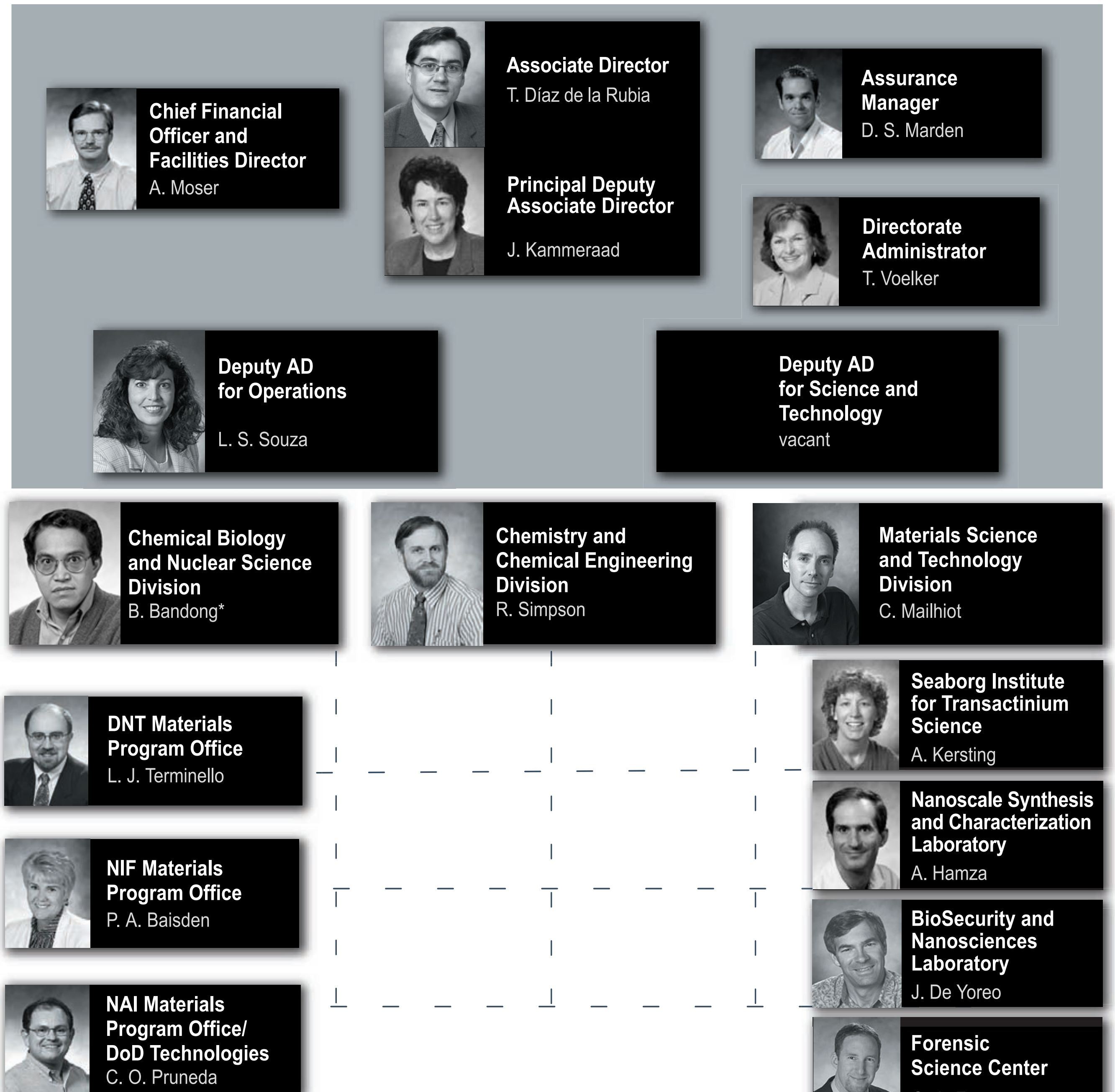
Directorate Quarterly Awards

Directorate Awards are given quarterly, based on the nominations received, and provide individuals or teams with cash awards ranging from $75 to $1,000. The criteria for Directorate Awards are as follows:

- Significant scientific/technical accomplishment, breakthrough, or discovery.
- Outstanding and/or unusual creativity and/or initiative used in accomplishing work assignments, including problem definition and solution.
- Significant innovation by an individual or a team that contributes to progress towards the completion of a project milestone.
- Exemplary performance to meet an important organizational need.

Table 6 lists the FY04 recipients.

Figure 7. CMS Directorate Organizational Chart



*Acting

Spot Awards

Spot Awards, which consist of memorabilia and certificates of recognition, are distributed by senior managers. Recipient names are maintained by the division offices. The criteria for Spot Awards are as follows:

- Significant improvement of quality, efficiency, safety, and productivity in all categories
- Administrative or management practices that have a positive organizational effect
- Outstanding achievements in support of CMS Directorate goals or values (e.g., for community service, ES&H, cost-cutting/enhanced efficiency, educational outreach, and diversity)

Programmatic contributions are recognized by the program directorates through their awards programs.

Staffing and Demographics

As of September 30, 2004, the CMS workforce numbered 536. This workforce is composed of 67% career employees (359 total), 15% flex-term appointments (79 total), 7% postdoctoral researchers (39 total), 9% noncareer employees (49 total), and 2% (10 total) supplemental laborers (see Table 7 and Figure 8).

Table 8 and Figure 9 show a staff profile by degree composition for career employees, with a total staff of 359. About 71% of scientists and engineers in CMS have PhDs. The staffing breakdown is 72% scientists and engineers, 16% technicians, and 12% administrative and clerical personnel.

A breakdown of the scientific staff by discipline is shown in Table 8. The scientific and engineering disciplines are composed of 14% physicists, 37% chemists, 13% engineers, 8% metallurgists, and 1% biological scientists, environmental scientists, mathematicians, and computer scientists.

A staff profile by discipline spanning the past five years is shown in Figure 10.

Financial and Full-Time-Equivalent Highlights

Figure 11 shows the total number of CMS FTEs as well as the FTEs supported by internal funding and FTEs matrixed out to specific directorates to support Laboratory programs from FY01 to FY05.

Table 6. CMS Directorate Quarterly Awards in 2004

Name	Accomplishment
Anthony Esposito, Chad Talley, Christopher Hollars, Thomas Huser, James Chan, and Steve Lane	Excellence in Publication, “Reagentless Identification of Single Bacterial Spores in Aqueous Solution by Confocal Laser Tweezers Raman Spectroscopy”
Laurence Fried, Mike Howard, and Sorin Bastea	Excellence in Publication, “Generation of Methane in the Earth’s Mantel: In Situ High P-T Measurements of Carbonate Reduction”
Zurong Dai, Sasa Bajt, Giles Graham, and John Bradley	Excellence in Publication, “Carbon and Nitrogen Isotopic Anomalies in an Anhydrous Interplanetary Dust Particle”
Roger Qiu, Christine Orme, and James De Yoreo	Excellence in Publication, “Molecular Modulation of Calcium Oxalate Crystallization by Osteopontin and Citrate”
Sonia Letant, Bradley Hart, Sharon Shields, John Reynolds, Masood Hadi, and Staci Kane	Excellence in Publication, “Enzyme Immobilization on Porous Silicon Surfaces”
Alex Ballard, Scott Dougherty, Marleen Emig, Michael Fluss, Galen Hazelhofer, Theresa Healy, George Kitrinos, Karen Rath, Gabriele Rennie, Stephanie Shang, Katie Walter, and Charles Westbrook	Outstanding contributions to CMS scientific and technical publications in 2004
Julie Herberg	Recognition for receiving the Best Poster Award for “Lithography Patterned Microcoils for High-Sensitivity NMR” at the 2004 Materials Research Society national meeting
Riad Manaa	Founded a new session “Simulations of Matter at Extreme Conditions” at the 2004 American Physical Society national meeting
Roz Swansiger	Created a safe work environment for handling explosives
Katie Thomas	Contributed to the BSNL/Center for Biotechnology, Biophysical Sciences, Bioengineering September 2004 Media Event
Sheri Miner, Daphne Dugan, Dawn Areson, Debora Hackel, Roseanne Kamerdula, Michaela Salas, Cherie Napier, Hugh Gregg, Bryan Bandong, Tammy Gdowski, and Joseph Carlson	Successful execution of the DOE Classified Removable Electronic Media (CREM) 2004 audit.

Figure 8. Five-Year CMS Population Distribution by Workforce Category

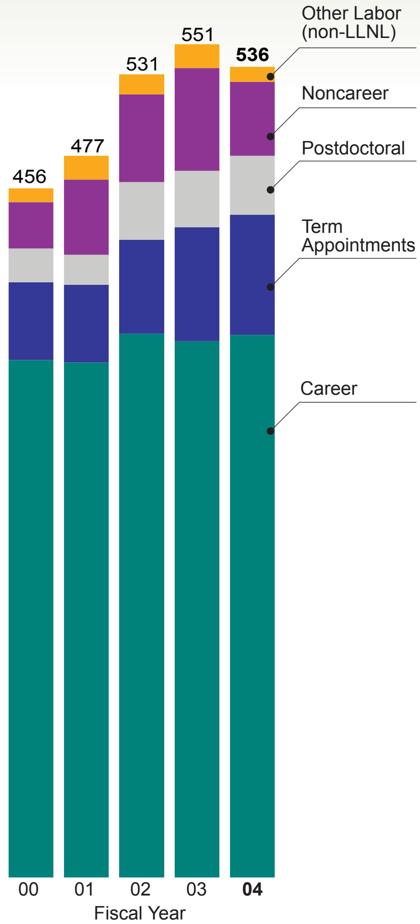


Table 7. CMS Workforce Categories

Workforce Category	FY00	FY01	FY02	FY03	**FY04**
Career Employees	342	341	360	355	**359**
Term Appointments	52	51	62	75	**79**
Postdoctoral Researchers	22	20	38	37	**39**
Noncareer Employees	31	50	58	68	**49**
Other Laborers (non-LLNL)	9	15	13	16	**10**
Total CMS Workforce	456	477	531	551	**536**

Figure 9. CMS Staff Profile by Degree Composition

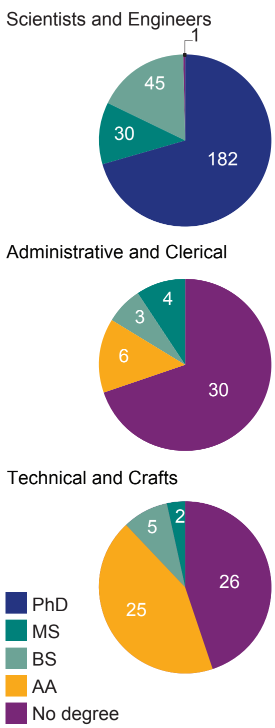


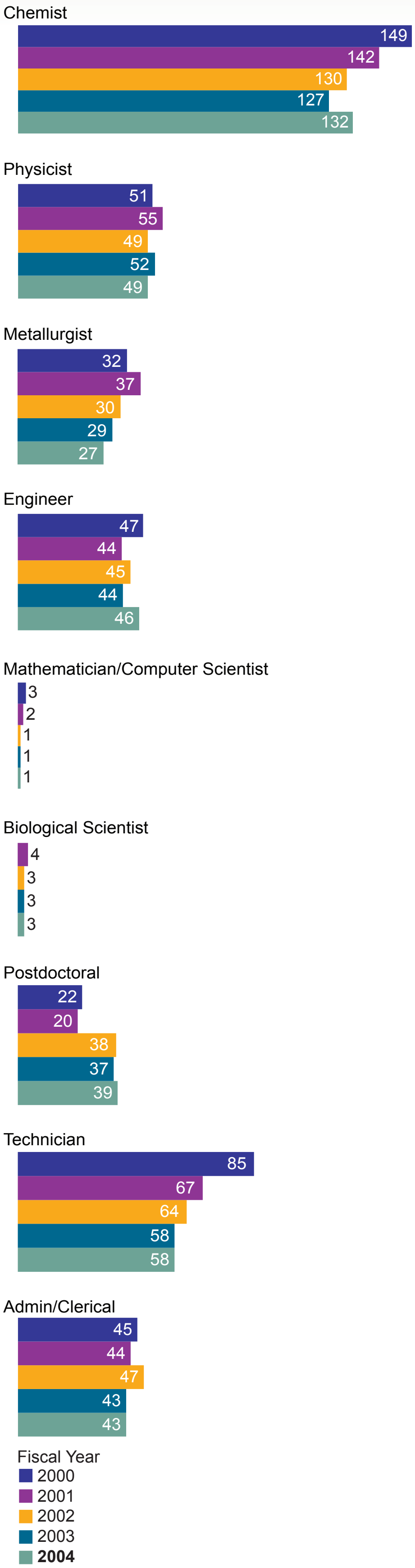
Table 8. CMS Staff Profile by Job Title and Degree Composition

Job Title	PhD	MS	BS	AA	No Degree	Total	Staff %
Scientists and Engineers							
Physicists (270, 277)	46	3	-	-	-	49	14%
Chemists (242)	89	14	28	-	1	132	37%
Engineers/Patent Engineers (168, 249)	25	10	11	-	-	46	13%
Mathematicians/Computer Scientists (256, 285)	-	-	1	-	-	1	-
Biological Scientists (225, 277, 235, 228, 221)	-	-	3	-	-	3	1%
Environmental Scientists (230)	-	-	-	-	-	-	-
Biophysicists (235, 270)	-	-	-	-	-	-	-
Metallurgists (265)	22	3	2	-	-	27	8%
Medical Doctors (Staff) (263)	-	-	-	-	-	-	-
Political Scientists (295)	-	-	-	-	-	-	-
Faculty Scholars (297)	-	-	-	-	-	-	-
Total Scientists and Engineers	182	30	45	0	1	258	72%
Administrative and Clerical							
Management (196, 197)	-	3	-	-	-	3	1%
Professional (163–165, 169, 170)	-	-	-	-	-	-	-
Administrative (100–162, A01, C01, F02)	-	1	2	2	17	22	6%
Clerical/General Services (400–462)	-	-	1	4	13	18	5%
Total Administrative and Clerical	0	4	3	6	30	43	12%
Technical and Crafts							
Security/Fire Department (051, 055, 650–656)	-	-	-	-	-	-	-
Technical (302–339, 393, 347–391, 502–588, 593)	-	2	5	25	26	58	16%
Trades (722–799, 805–990)	-	-	-	-	-	-	-
Facilities/OJT*/General Helper (700, 701, 704, 801)	-	-	-	-	-	-	-
Total Technical and Crafts	0	2	5	25	26	58	16%
Total CMS Workforce	182	36	53	31	57	359	100%
Degree Composition Percent	51%	10%	15%	9%	16%	100%	

*OJT = on-the-job training

Numbers in parentheses are job classifications.

Figure 10. Five-Year CMS Staff Profile by Discipline



CMS funding sources from FY01 to FY05 are illustrated in Figure 12 and summarized below.

Internal CMS Funding

- **Discipline S&T**—Funding comes from DOE, federal, and nonfederal sponsors.
- **CMS Infrastructure**—Funding comes from the CMS Directorate program management charge (PMC), organizational facility charge (OFC), and organizational personnel charge (OPC) collections.
- **Institutional Investment**—Funding comes from the Laboratory's general and administrative (G&A), institutional general-purpose equipment (IGPE), and Laboratory Directed R&D (LDRD) collections.
- **Materials Computation, Analysis, and Processing (MCAP) Support Centers**—Funding comes from CMS Scientific Service Center collections.

Non-CMS Funding

- **Program Support**—The CMS Directorate primarily provides discipline personnel for support to all Laboratory programs. Support for matrixed staff to program elements is received from other cost centers as FTE allocations.

Distribution of FTEs

Table 9 shows how CMS-managed activities are supported according to funding sources. There are four categories:

- **Category 1—Discipline S&T** consists of research projects over which the directorate has jurisdiction. In FY04, this involved 11 CMS FTEs and 8 FTEs matrixed in from other organizations for a total budget of $10.7 million.
- **Category 2—CMS Infrastructure** consists of indirect activities involved in operating the CMS Directorate. In FY04, this included 59 CMS FTEs and 42 FTEs matrixed in from other organizations for a total budget of $23.3 million.

Figure 11. Number of CMS FTEs during the Past Five Years

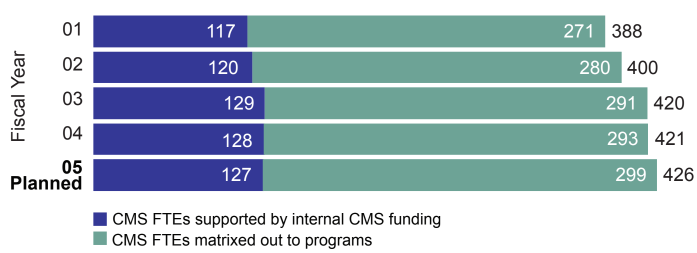
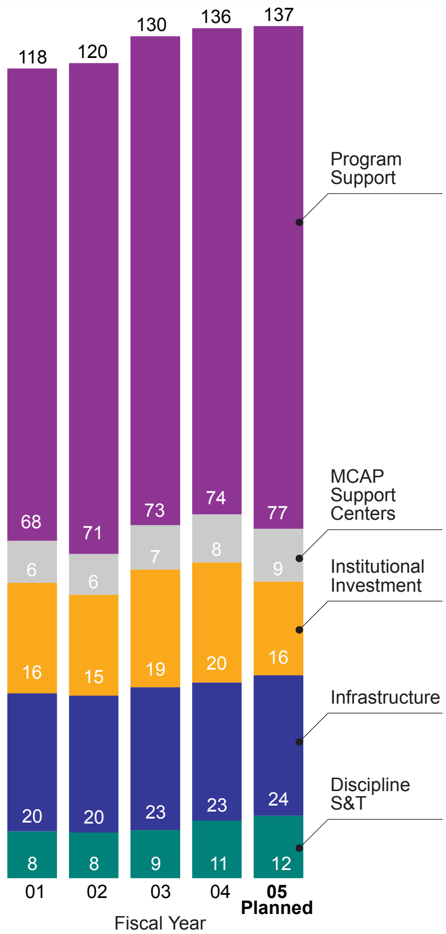


Figure 12. CMS Funding Sources during the Past Five Years



- **Category 3—Institutional Investment** consists of indirect activities. In FY04, this included 28 CMS FTEs and 12 FTEs matrixed in from other organizations for a total budget of $19.6 million.
- **Category 4—MCAP Support Centers** consists of scientific services (e.g., analytical and processing activities) supporting Laboratory programs. In FY04, this included 30 CMS FTEs and 7 FTEs matrixed in from other organizations for a total budget of $8.0 million.

In FY04, the sum for the CMS-managed operating cost centers was $59.3 million with 197 FTEs (128 from CMS and 69 matrixed in). When added to the estimated cost of personnel (293 FTEs) matrixed to support the programs, the CMS Directorate's total operating cost was about $133.3 million with a capital-equipment budget of $2.3 million, for a total of $135.6 million.

Table 9. Distribution of Operating and Capital Funds and FTEs for CMS Cost Centers

	FY04 Actual 9-30-04			**FY05 Planned 1-01-05**		
	$M	CMS FTEs	Other FTEs	**$M**	**CMS FTEs**	**Other FTEs**
Category 1—Discipline Science and Technology						
NNSA Direct Operating	-	-	-	**-**	**-**	**-**
DOE Direct Operating	3.5	2	3	**4.1**	**3**	**3**
Work for DOE/Integrated Contracts	1.7	5	-	**1.7**	**2**	**-**
Non-DOE	5.4	4	5	**5.7**	**2**	**4**
Non-Contract Costs	0.1	-	-	**0.1**	**-**	**-**
Total Category 1	10.7	11	8	**11.6**	**7**	**7**
Category 2—Infrastructure						
OPC	10.8	47	3	**11.1**	**51**	**3**
PMC	1.0	3	1	**1.1**	**3**	**1**
OFC	11.5	9	38	**11.8**	**8**	**34**
Total Category 2	23.3	59	42	**24.0**	**62**	**37**
Category 3—Institutional Investment						
G&A	11.1	15	9	**9.1**	**12**	**9**
G&A—Special Employee Program (Postdoctoral/Summers)	-	-	-	**-**	**-**	**-**
IGPE	2.3	-	-	**2.3**	**-**	**2**
LDRD—Exploratory Research in the Disciplines (ERD)	6.3	13	3	**4.5**	**13**	**3**
Total Category 3	19.6	28	12	**15.9**	**25**	**14**
Category 4—MCAP Support Centers						
Scientific Service Centers	8.0	30	7	**8.7**	**34**	**6**
Total CMS Operating and Capital	61.6	128	69	**60.2**	**127**	**63**

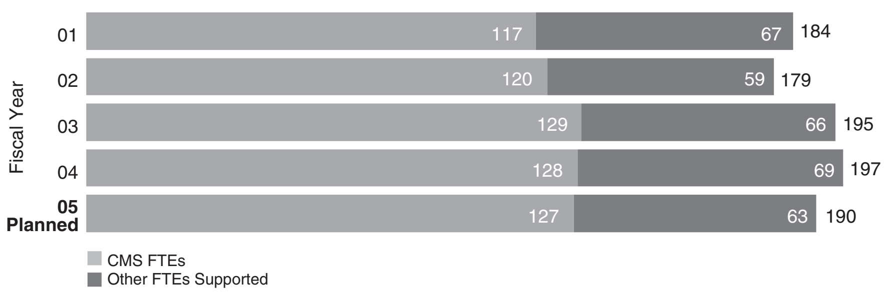
Minor variances may occur due to rounding.

In FY05, the CMS-managed operating cost accounts are expected to be $57.9 million with 190 FTEs (127 from CMS and 63 matrixed in). When added to the estimated cost of personnel matrixed (299 FTEs) to support the programs, the CMS Directorate's total operating cost would be about $134.9 million with a capital-equipment budget of $2.3 million, for a total of $137.2 million.

Figures 13 and 14 show operating and capital costs along with FTEs from FY01 to FY05 (planned).

Figure 13. Five-Year Distribution of Operating and Capital Funds for CMS Cost Centers ($M)

Figure 14. Five-Year Distribution of CMS and Other FTEs Supported for CMS Cost Centers



Lori Souza
Deputy Associate

Operations Office

The Operations Office is responsible for developing and implementing CMS' strategies to enhance and promote a culture of excellence in science and technology and operations.

The Operations Office leads and manages the safety, security, information technology, and communications activities necessary to ensure a high-quality, cost-efficient workplace in support of CMS mission. The CMS Operations Management Structure is shown in Figure 15.

Strategic Planning

Strategic planning for CMS includes the creation, development, and implementation of a long-term strategic plan and the implementation of directorate organizational changes required by key strategies. To fully realize the vision of being the premier provider of scientific leadership in support of Laboratory programs, CMS works to anticipate changes and meet new programmatic needs through innovations in science and technology. CMS continues to provide an exceptional and safe work environment that attracts and retains a vital and diverse workforce.

Safety

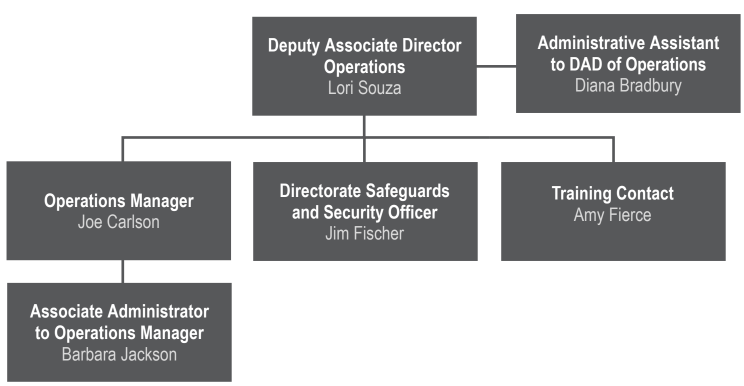
CMS provides workers with a safe work environment, necessary resources to perform the job, and adequate procedures and controls to ensure the work is performed safely. CMS embraces the ISMS philosophy that helps ensure that work is performed safely and in compliance with applicable ES&H requirements. It is to this end that we have developed and implemented ES&H roles, responsibilities, and authorities.

CMS Operations recognizes and understands the opportunities and value of DOE/UC contract requirements for ISMS at LLNL. We readily accept the DOE ISMS objectives, guiding principles, and core functions, as well as the LLNL fundamental guiding principle and institutional requirements. We are committed to implementing and using ISMS in all CMS programs, operations, facilities, and activities.

The Operations Office is responsible for the following:

- ISMS management.
- ES&H support.
- Facility safety teams and safety officers.
- Safety documentation including National Environmental Policy Act, Environmental Impact Report, and National Emission Standards for Hazardous Air Pollutants management.

Figure 15. CMS Operations Office Management Structure



Security

CMS has implemented Integrated Safeguards and Security Management (ISSM) methods to protect security assets. ISSM builds on the tradition of continuous enhancement by ensuring that our existing security systems are fully integrated into our work activities in a cost-effective, value-added way. CMS develops systems to ensure that employees clearly understand their security roles, responsibilities, and expectations; take ownership and responsibility for following security requirements; and understand what needs to be protected, as well as how and why.

The Operations Office is responsible for managing the following:

- Directorate safeguards and security officer.
- Information security (including review by authorized derivative classifier, and repository checking).
- Computer and network security.
- Security plans.

Staff and Organization Development

The Operations Office is responsible for staff and organizational development. The directorate's organizational structure of divisions, centers, and institutes supports a team environment across disciplinary lines. This structure, which is summarized below, offers collaborative, problem-solving opportunities that attract the best and the brightest from around the world.

- The divisions are responsible for line management and scientific, technical, and administrative leadership of the technical and administrative staff. Each division maintains a close relationship with Laboratory programs, working with directorate and program leaders to ensure an effective technical response to programmatic needs. The divisions conduct scientific and technical research in support of one or more of the four research themes.
- The centers provide specific research environments to support the nation's needs in biosecurity; chemical, nuclear, biological, and high-explosives counterterrorism; and R&D of explosives, pyrotechnics, and propellants.
- The programs at the institutes are tailored to reach a broad range of scientific talent, encourage and foster excellence, and attract high-quality scientists. Each institute provides a unique opportunity for outstanding students to experience big science in the dynamic environment of a national laboratory.

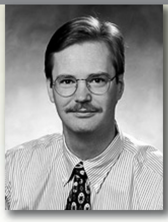
The Operations Office is responsible for managing CMS Directorate personnel activities, including all aspects of the following:

- Performance management.
- Salary and compensation procedures.
- Recruiting.
- Hiring and placement.
- Awards and recognition programs.
- Employee development.
- Training.
- Diversity and affirmative action initiatives.
- All other personnel administrative activities.

Information Technology

The Operations Office is also responsible for the CMS Directorate's information technology tasks, including:

- Computer operations desktop support for Mac, PC, and UNIX systems.
- Network maintenance operations.
- Server administration.
- Printer setup and service.
- Open and closed LabNet connections.



AL MOSER
CHIEF FINANCIAL OFFICER AND FACILITIES DIRECTOR

Finance and Facilities Office

The Finance and Facilities Office is responsible for developing and implementing financial, business, and facility strategy in support of CMS' mission. We support simultaneous excellence in science and technology and operations by leading and managing high-quality, cost-effective infrastructure activities for CMS employees and residents. The Finance and Facilities Office performs the activities listed below. Figure 16 shows the CMS Finance and Facilities Office Management Structure.

Financial Management

- Management oversight.
- Budget planning.
- Funding proposals.
- Cost analysis, tracking, and reporting.
- Account maintenance.
- Audit representation.

Business Services

- Ergonomics evaluation program.
- Electrical inspections.
- Property management.
- Procurement services.
- Excess equipment acquisition (from other federal sites).
- Storeroom supplies.
- Business machines.
- Vehicle fleet management.
- Conference-hosting support.
- Database development and maintenance.
- Technical writing and editing.
- Graphic design and illustration.
- Directorate-wide Web development and maintenance.
- Publications.

Facility Services

Strategic Space Planning and Utilization

- Planning for current and future needs of facilities.
- LLNL space and site planning interface.
- CMS program area plans (institutional).
- Return of facilities to the Laboratory.

Facility Authorization Basis

- Safety analysis reports, hazard analysis reports, and authorization basis.
- Facility safety plan generation, review, and publication.
- Emergency preparedness and response plans.

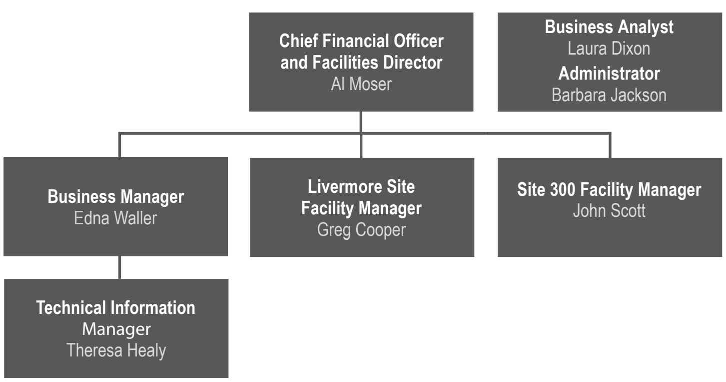
Management and Maintenance of CMS Facilities

- Management of physical structures, building systems, and facility personnel.
- Facility utilities (e.g., Laboratory facility charge, electricity, telephones, and industrial gases).
- Facility maintenance and improvements.
- Project and construction management.

Space Use and Utilization Processes and Leadership

- Coordination of space assignments, maintenance of tracking systems, and office move support and execution.
- Laboratory/office transfers, room responsible person (RRP) assignments, and maintenance of RRP database.
- Maintenance of billing information.

Figure 16. CMS Finance and Facilities Office Management Structure



Please see our Web sites:
(external)
http://www-cms.llnl.gov
(internal)
http://cmsonly.llnl.gov

Doug Marden
Assurance Manager

Assurance Office

The CMS Assurance Office is responsible for independent oversight of ES&H implementation within the directorate. To be able to perform this function, the Assurance Office is independent of the facilities and programs it is charged to assess, meaning that it is not assigned responsibility for the technical performance, cost, or schedule of facility or programmatic work. The Assurance Office reports directly to the AD, presenting the results of assessments, identified vulnerabilities, and areas of noncompliance.

Assurance Office Mission

The mission of the Assurance Office is to promote a safe work place and to reduce the potential for public and personnel injury. The goals of this office are to do the following:

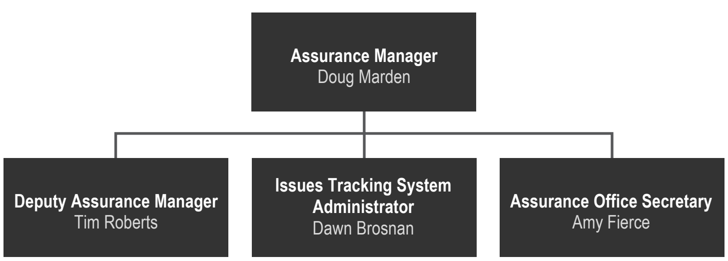
- Guide personnel in practices that maintain the integrity of Laboratory facilities and equipment and protect public property.
- Provide the AD with assurance that CMS operations comply with applicable laws and policies.
- Favorably affect the ability of CMS programs to meet their goals.
- Facilitate a healthy and knowledgeable ES&H culture.
- Improve the quality of ES&H programs and documents, including those developed at the institutional level.
- Encourage protection of the environment.

Assurance Office Responsibilities

The Assurance Office is responsible for independent oversight of CMS Directorate organizations, activities, and facilities to assure proper implementation of the ES&H program. The Assurance Office is responsible for:

- Advising CMS management and staff on ES&H issues; advising managers of changes to institutional ES&H requirements and guidance, and suggesting implementation options; and securing management input on LLNL proposals, ES&H policies, and procedures if possible.
- Providing guidance on methods for working safely and implementing ES&H requirements.
- Preparing, reviewing, and maintaining directorate management documents, such as plans and procedures, to facilitate conformance with Laboratory ES&H policies. Also responsible for reviewing subordinate ES&H documents where appropriate.
- Performing assessments and walk-throughs, and maintaining the CMS Issues Tracking System (ITS) data.
- Providing a monthly report to the AD on ES&H issues.

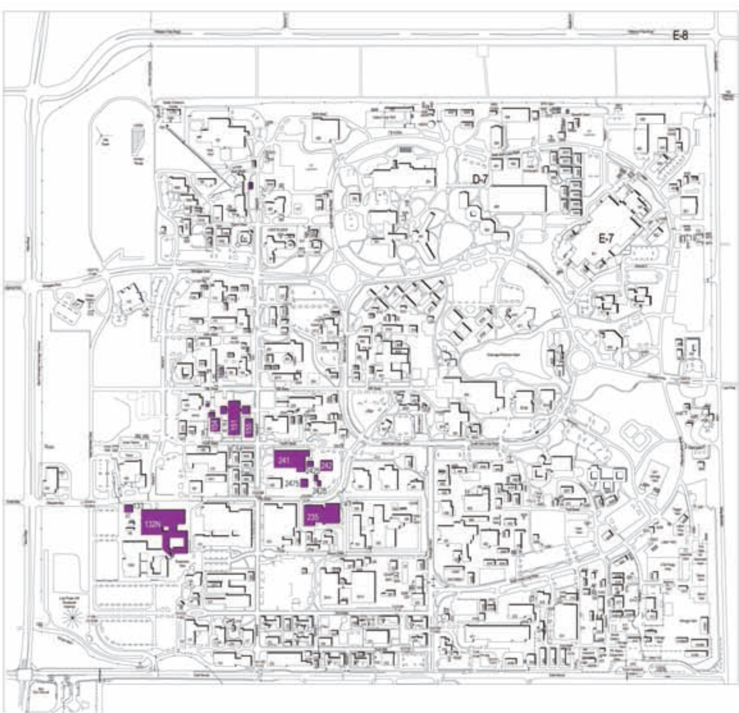
Figure 17. CMS Assurance Office Management Structure



- Determining the requirements for reporting on unplanned events in CMS facilities, and managing CMS' occurrence reporting program. For incidents in radiological facilities or with radiological activities, responsible for invoking the LLNL Price Anderson Amendments Act Office as appropriate.
- Maintaining archival ES&H files pertaining to audits and appraisals of CMS.
- Administering the CMS Lessons Learned Program.
- Representing CMS on the LLNL ES&H Working Group to address and resolve institutional and cross-directorate ES&H policy issues.
- Assessing implementation of ISM within the directorate, including the annual self-assessment of implementation of the ISMS. The assessment includes a review of the directorate ISMS plan to ensure it remains workable, current, and in conformance with the LLNL ISMS Description and LLNL *ES&H Manual*.
- Assisting CMS in the development and use of appropriate metrics to manage, evaluate, and improve safety performance.
- Monitoring the closeout of deficiencies to ensure timeliness and adequacy of the corrective actions, particularly priority and occurrence-report-driven deficiencies.
- Functioning as the directorate point of contact for external ES&H issues, including interfacing with external groups including DOE, UC, and other state and governmental agencies.
- Assisting in root cause analysis and determination of ES&H trends affecting CMS.

CMS Facilities

Building 242, the Newest CMS Facility, Was Completed in 2005.



Map of Livermore Site Highlighting CMS Facilities.

CMS manages several large scientific facilities (see Table 10) at Livermore (Site 200) and at Site 300 in support of Laboratory objectives. We house more than 500 employees who conduct experiments in more than 250 laboratories. Work completed in CMS facilities range from nanoscale science, to computational chemistry, to certified environmental analyses, to high-explosives synthesis and processing. CMS Operations supports these activities and manages associated hazards cost effectively, providing a safe and secure environment to conduct world-class chemistry and materials science.

Site 200, the LLNL main site, is located within the Livermore city limits on 1 square mile of land. CMS facilities are in the heart of the Laboratory, and all CMS facilities are within walking distance of one another. We have responsibility for more than 400,000 gross square feet of space, including 10 permanent buildings and 6 trailers. The newest facility, Building 242, is less than 1-year old, and Building 241 is the oldest at 45 years of age.

Site 300 is set on 7,000 acres of land in a relatively remote area about 15 miles east of Livermore. It is marked by both rolling hills and steep ravines, with very few trees in sight. CMS facilities at Site 300 are used for larger scale high-explosives work, including synthesis, processing, and waste treatment. We have responsibility for approximately 60,000 gross square feet of space, including 38 permanent buildings and 11 magazines. The facilities range from 3 to 51 years old.

Standard metrics indicate that our facilities are both well-maintained and highly utilized.

Building 242, the newest CMS facility, was completed in February 2005. It provides 96 high-quality offices adjacent to two CMS laboratory facilities.

Figure 18 charts the facility condition index for our facilities at Sites 200 and 300. The facility condition index, a standard industry metric, is the maintenance backlog as a percentage of the replacement value of a facility. The average facility condition index for CMS Site 200 facilities is lower than the Laboratory average and near the industry standard for good practice. CMS will be consolidating and improving Site 300 facilities over the next several years, working closely with the programs currently using the facility. We have worked hard to identify and mitigate the effects of the highest priority maintenance issues in CMS facilities. CMS completed $1.75 million in maintenance backlog projects in FY04, with an additional $1.8 million in approved projects for FY05. The total deferred maintenance for CMS is now $10.44 million for Site 200 and $4.32 million for Site 300.

Figure 19 further describes the health of CMS facilities by major facility system. Colored symbols indicate the health of the systems. Facility infrastructure investment will be focused on systems that are red or yellow. The projected timeframe for completing the infrastructure projects is also shown in Figure 19. If funded, these projects will ensure that CMS facilities remain vital and able to support future S&T activities.

Ensuring that facilities are available is key to the success of CMS Operations and the programs we support. Figure 20 depicts the availability of major CMS scientific facilities at Site 200 for FY04. The goal of CMS Site 200 Facility Operations is to minimize unplanned facility downtime (i.e., facility equipment failures) by scheduling maintenance windows

Table 10. CMS Facilities Profile

Building	Facilities	Building Characteristics	Primary Functions	Facility Replacement Value*
Site 200				
B132N Complex Chemistry Laboratories	• B132N—10 years old • B133—11 years old • T1602—26 years old • T1927—28 years old	• 113,669 gross square feet • Limited access • Wet chemistry • 33 laboratories • 108 offices	• Synthesis, formulation, and processing chemistry • Chemical analysis • Forensic science	• Facility—$86M • Equipment—$22M
B151 Complex Analytical and Isotopic Laboratories	• B151—37 years old • B152—28 years old • B154—14 years old • B155—2 years old • T1541—22 years old	• 132,336 gross square feet • Limited/controlled access • Wet chemistry • 89 laboratories • 187 offices	• Isotope sciences and radiochemistry diagnostics • Analytical and characterization services and technology • Geochemistry • Stockpile stewardship • Glenn T. Seaborg Institute • 150-seat auditorium	• Facility—$61.4M • Equipment—$24M
B235 Materials Science Laboratories	• B235—18 years old • T2428—28 years old • T2475—3 years old	• 97,895 gross square feet • Limited/controlled access • Instrument laboratories • 47 laboratories • 187 offices	• Materials development and technology • Material and chemical process theory, modeling, and computation • Materials characterization services and technology	• Facility—$33M • Equipment—$25M
B241 Materials Technologies Facility	• B241—45 years old • B242—<1 year old • T2425—42 years old	• 76,685 gross square feet • Controlled access • Instrument laboratories • 39 laboratories • 1 hi-bay • 127 offices	• Materials development and technology • Materials disposition • Materials containment • Biological laboratories	• Facility—$25M • Equipment—$6M
Site 300				
Chemistry Area	• 9 buildings between 36–45 years old	• 21,954 gross square feet • Limited access • 10 bays • 3 storage magazines	• Synthesis • Formulation • Mechanical pressing • Scaleup	• Facility—$7M • Equipment—$0.7M
Process Area	• 27 buildings between 3–47 years old	• 34,407 gross square feet • Limited access • 15 bays • 3 storage magazines	• Hot isostatic press • Radiography • Machining • Inspection • Assembly	• Facility—$13M • Equipment—$4.3M
Explosives Waste	• 2 buildings between 8–51 years old	• 2,698 gross square feet • Limited access • 5 storage magazines • 1 burn cage and pan • 1 control bunker	• Waste Storage • Waste Treatment	• Facility—$7M • Equipment—$0.03M

*Facility replacement value = original acquisition cost adjusted for inflation. Equipment (capital and attractive) cost is original acquisition cost only.
B = Building.
T = Trailer.

(planned facility downtime) of two weeks per year. We want our facilities to be 100% available the other 50 weeks of the year. The chart shows good performance in managing unplanned downtime and shows good performance in managing planned facility downtime.

Figure 21 indicates the increase in CMS facility residents over the last 8 years. Despite the rapid growth of residents in CMS facilities, we have continued to provide high-quality office space. Even with a 53% increase in the number of residents since FY97, only 9% of our residents are housed in trailers, versus 26% for LLNL as a whole. Furthermore, we added high-quality office space by completing construction of Building 155 in 2003 and acquiring Building 242 in 2005, which added 60 and 96 offices, respectively.

Figure 18. Facility Condition Index

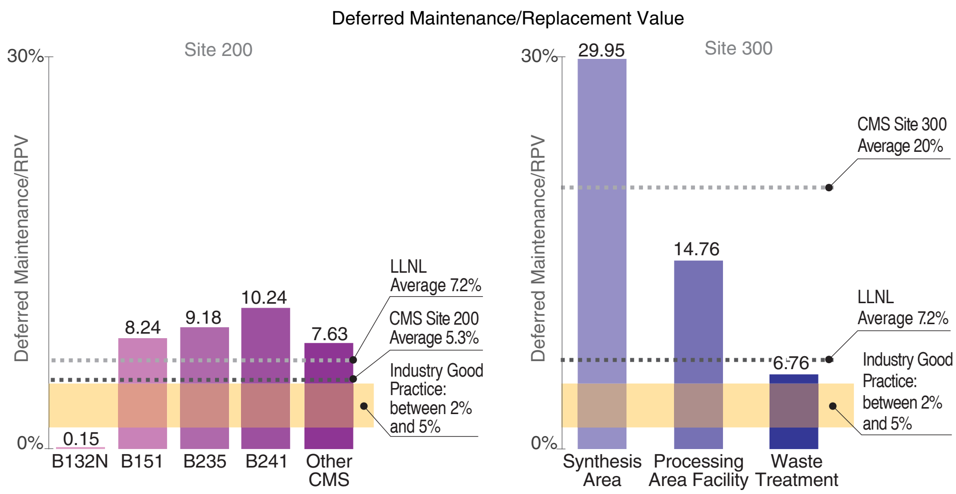


Figure 19. CMS Facility Health Index and Project Completion Date

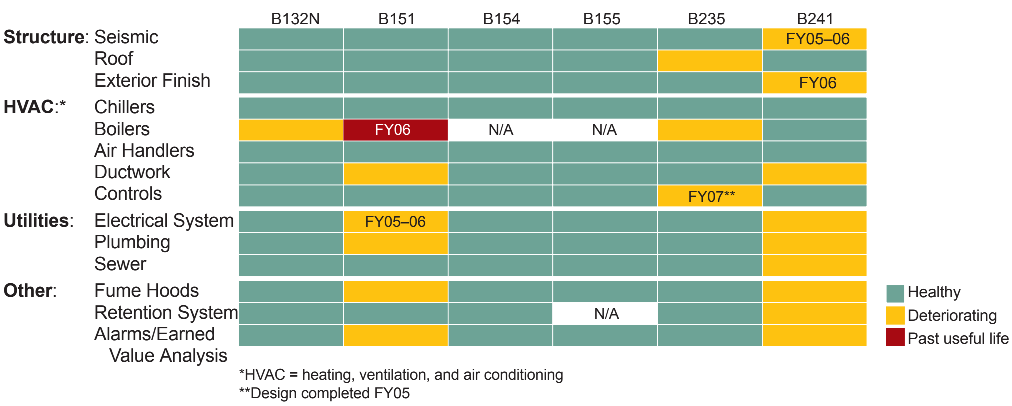


Figure 20. FY04 Planned Availability for CMS Facilities at Site 200

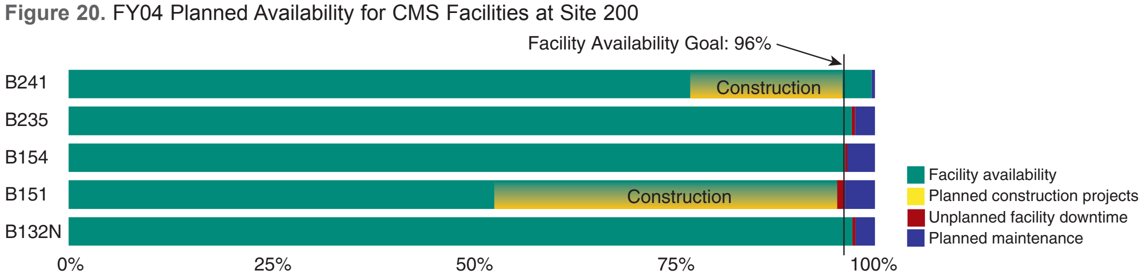
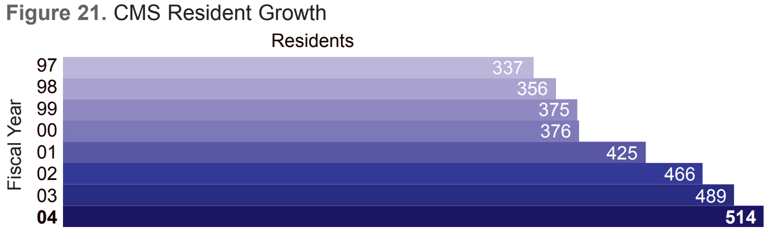


Figure 21. CMS Resident Growth



Facility Use by Directorate

CMS facilities are used to support a wide variety of Laboratory programs and organizations. Table 11 and Figure 22 illustrate the multiprogram nature of CMS facilities. The primary users of CMS facilities continue to be CMS, DNT, and NAI.

Facility Services Provided

CMS facility staff provide a wide variety of services to our residents:

- Utilities and Services included laboratory facility charge, electricity usage, industrial gas, and telephone communications.
- Safety included equipment electrical inspections, ergonomic assessments, and ES&H and hazardous waste management (HWM) supplies, as well as safety officers, facility safety chairpersons, Assurance Office, ES&H staff, and HWM technicians.
- Information Systems included support for more than 1,200 desktop Macintosh, PC, and UNIX computer systems including classified computing, network installation and connectivity, printer setup and service, trouble resolution, system administration, computer security, and server administration.
- Operations included operation management, database maintenance and development (e.g., Integrated Work Sheet, MoveIt, ChemIt, and TRR Express), and support from the AD facility manager and facility coordinators.
- Business Services and Consumables included property management, storeroom with office and laboratory supplies, copiers, facsimiles, government vehicles, common area printers, and labor services as established by the operation managers.
- Ongoing maintenance was provided by various Plant Engineering disciplines including painters, plumbers, electricians, welders, riggers, and laborers as directed by CMS facility coordinators. In FY04, this effort includes repairing TESA locks, liquid nitrogen gages, and various retention systems; testing oxygen systems; work on air-conditioning ducts; disposing of fume hoods; dry-walling and painting; installing white boards; replacing eye washes and showers; maintaining kitchenettes; and cleaning up and repairing water damage. Safety projects included installing nonskid material and fire-retardant foam; enhancing crosswalks with Botts dots, signs, and yellow striping; installing aluminum railing on roof; testing smoke detectors; purchasing and installing fire extinguishers; fixing impending obstructions; installing seismic bracing; repairing ladders; and maintaining basement fire sprinklers. One-time projects included securing a skylight structure in Building 235, purchasing fume hood monitors, fabricating and installing high-energy particulate air systems, installing roof access signs, evaluating air systems, and purchasing and installing fencing for storage areas.

In FY04, the cost for these services was \$11.5 million for Site 200. Figure 23 presents the percentages of cost for these services. In FY04, \$1.4 million in G&A funding was provided for Site 300 facility management.

Table 11. Directorates Charged for Site 200 CMS Space

Directorate	FY04 ($K)	%
CMS		
Infrastructure	1,240	11
MCAP Support Centers	1,079	9
Institutional Investment	1,045	9
Discipline S&T	448	4
DNT	3,473	30
NAI	1,752	15
E&E	627	5
SEP	494	4
Deputy Director Science—LDRD	379	3
NIF	275	2
Deputy Director Operations	167	1
Engineering	145	1
Various	425	4
Total CMS Space	11,548	100

September 30, 2004.
Site 300 is not included because it is funded by G&A.
\$K = thousands of dollars.

Figure 22. Percentage of CMS Facility Services and Operating Costs for Site 200

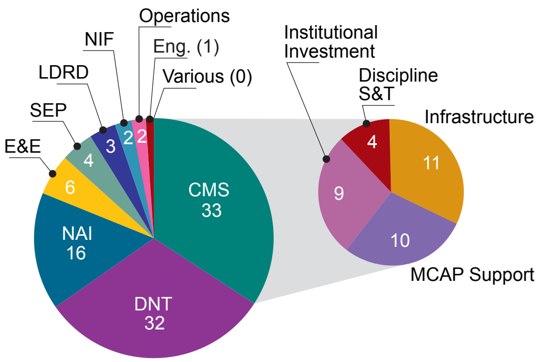
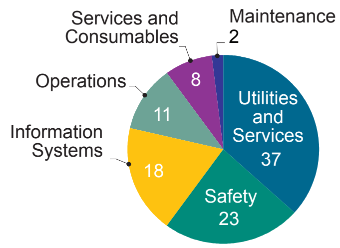


Figure 23. Percentage of Cost for CMS Services for Site 200



Research Administration and Funding

Research is an integral part of the CMS Directorate's discipline development. Oversight and policy making are vested in the AD's office. Currently, the principal deputy AD assumes general responsibility for administering the LDRD-funded research effort, with guidance from the CMS AD and assistance from the strategic theme leaders. Programs and projects are reviewed internally as well as externally. Funding for R&D that is managed in the directorate comes primarily from LDRD, the DOE Office of Basic Energy Sciences (OBES), and reimbursable work for others.

Laboratory-Directed Research and Development

An order issued by DOE provides for an LDRD program that uses an annual percentage (6%) of the Laboratory's budget for discretionary research. Livermore's LDRD program is divided into three major funding categories: Strategic Initiatives (SIs); Exploratory Research in the Disciplines (ERD), Programs, and Institutes; and Laboratory-Wide Competition (LW).

Strategic Initiatives

SI projects must be strongly aligned with the Laboratory's strategic directions and long-term vision. A SI project should perform innovative R&D that sets new directions for existing programs, explores new concepts, and/or extends the Laboratory's S&T base.

CMS scientists may serve as SI principal investigators or participate as key team members on program-sponsored strategic initiatives.

Exploratory Research in the Disciplines, Programs, and Institutes

Projects in the ER category emphasize innovative R&D activities in support of the CMS strategic direction and long-term vision. The CMS strategic theme areas are

- Materials properties and performance under extreme conditions.
- Extreme chemistry and chemical engineering.
- Science at the intersection of chemistry, biology, and materials.
- Applied nuclear science for human health and national security.

Table 12 shows the FY05 CMS ERD portfolio. In general, support for a project is limited to, at most, three consecutive years (36 months) in this program.

Two strategic objectives define how CMS uses its ERD portfolio:

1. **Program-Related Projects.** Fundamental research that provides a basic scientific understanding of a technical challenge faced by a program and acknowledged by the program as being important. In many cases, CMS is successful in encouraging programs to coinvest their LDRD funds on these projects. Table 12 summarizes program-related CMS projects and associated programmatic coinvestments.
2. **New Scientific Capabilities.** Development of new science and capabilities that will seed enduring, externally funded, fundamental science in areas of current or future importance to the Laboratory. In some cases, these projects represent a new focus area such as computational chemistry, biochemistry, health sciences, and nanosciences, as shown in Table 12.

CMS' selection process focuses on projects meeting these strategic objectives, but it also includes several other important criteria:

- Projects must be based on the execution of excellent science.
- Whenever possible, projects should provide an opportunity for more experienced scientists in CMS to work with younger staff (especially postdoctoral researchers) in a mentoring relationship.
- Partnering and collaboration with other directorates is encouraged in all areas and is required for program-related research.

Laboratory-Wide Competition

Projects in this category emphasize innovative research concepts and ideas with limited management filtering to encourage the creativity of individual researchers. Table 12 also includes three LW projects, which are managed by the Laboratory's Science and Technology Deputy Director.

Table 12. CMS FY05 LDRD Projects and Funding Levels

CMS Contacts		Project Title	Funding ($K)	Directorate Cofunded ($K)	Capital ($K)
Exploratory Research in the Disciplines					
Program-Related ERD—DNT					
J. McNaney	03-ERD-015	Strain Rate Scaling of Deformation Mechanisms	123.8	200.8	0.0
J. Wong	03-ERD-017	Phonon Dispersion Curves Determination in Delta-Phase Pu-Ga Alloys	148.8	300.0	0.0
J. Colvin	03-ERD-018	Determination of the Microstructural Morphology of Shock-Induced Melt and Resolidification	123.8	247.0	0.0
M. Fluss	03-ERD-077	Plutonium and Quantum Criticality	223.8	295.0	0.0
A. Nelson	04-ERD-010	Time-Resolved Dynamic Studies Using Short Pulse X-Ray Radiation	173.8	192.5	0.0
E. Bringa	04-ERD-021	High-Strain-Rate Deformation of Nanocrystalline Metals	198.8	175.0	0.0
L. Fried	04-ERD-069	Ionization Chemistry of High Temperature Molecular Fluids	112.1	175.0	1.7
J. Tobin	04-ERD-105	NanoBIS Determination of the Unoccupied Electronic Structure of Pu	109.8	126.0	89.0
T. van Buuren	05-ERD-003	The Structure and Properties of Nanoporous Materials	98.8	200.0	0.0
A. Kubota	05-ERD-020	Fully Atomistic Simulations of Hydrodynamic Instabilities and Mixing	148.8	180.0	0.0
Program-Related ERD—NIF					
J. Britten	03-ERD-059	Large-Aperture Diffraction Gratings, the Enabling Technology for High-Energy Petawatt Lasers	500.0		0.0
M. McElfresh	03-ERD-074	Novel Methods for Bonding Disparate Materials	148.8		0.0
S. Demos	05-ERD-016	Characterization and Control of Laser-Induced Modifications in KDP and DKDP Crystals	298.8	200.0	0.0
Program-Related ERD—NAI					
A. Malkin	04-ERD-002	Multiprobe Investigation of Proteomic Structure of Pathogens	75.0	75.0	0.0
M. Wang	04-ERD-107	Nanomaterials for Radiation Detection	198.8	100.0	0.0
P. Weber	04-ERD-039	Bioforensics: Attribution of Biological Weapons Agents by NanoSIMS	148.8		0.0
J. Camarero	04-ERD-040	Developing New Tools for the In Vivo Generation and Screening of Cyclic Peptide Libraries	74.8	200.0	0.0
B. Hart	05-ERD-025	Avoiding Surprise: Countering Novel Chemical/Biological Weapon (CBW) Agent Threats	98.8	300.0	0.0
New Scientific Capability—General					
T. Gonis	03-ERD-064	A Two-Particle Formulation of Electronic Structure	173.8		0.0
New Scientific Capability—Extreme Chemistry					
J. Crowhurst	05-ERD-039	Determination of the High-Pressure Melting Curve of Iron	148.8		0.0
New Scientific Capability—Applied Nuclear Science					
J. Patin	04-ERD-085	Is the Island of Stability Centered at Z=114?	248.8		0.0
New Scientific Capability—Intersection of Chemistry, Materials Science, and Biology					
O. Bakajin	03-ERD-050	Carbon-Nanotube Permeable Membranes	198.8		0.0
O. Bakajin	05-ERD-078	Discovering the Folding Rules that Proteins Obey	150.0		0.0
J. Herberg	05-ERD-026	Chemical Specific Cellular Imaging of Biofilm Formation	148.8		0.0
J. Perkins	04-ERD-007	Dynamic Combinatorial Libraries for Target Driven Ligand Development	223.8		0.0
C. Mundy	05-ERD-021	Heterogeneous Processes at the Intersection of Chemistry and Biology	198.8		
S. Letant	03-ERD-013	DNA Detection through Designed Apertures	228.8		0.0
Total ERD			4,726.5	2,966.3	90.7
Laboratory-Wide Competition					
B. Hart	03-LW-047	Laser-Initiated Nanoscale Molecularly Imprinted Polymers	189.0		0.0
J. Camarero	05-LW-018	Development of a Chemoenzymatic-Like and Photo-Switchable Method for the Ordered Attachment of Proteins to Surfaces	189.0		0.0
A. Noy	05-LW-040	Molecular Transport in One-Dimensional Lipid Bilayers: A Biological “Smoke Alarm”	114.7		0.0
Total LW		Subtotal (Without Cofund)	492.7		0.0

DOE Direct

The Basic Energy Sciences (BES) mission at LLNL focuses on the fundamental science that supports national mission needs for energy independence, environment, and national security. Specifically, LLNL BES activities focus on atomic-level investigations of the dynamic response of materials, bioscience, geosciences, nanoscale materials science, high-performance ab initio computational nanoscience, computational materials science of microstructure evolution, and actinide science. We apply unique LLNL capabilities to basic science investigations of interest to the DOE Office of Science and bring the Laboratory's scientific challenges to BES facilities for exploration and discovery.

The CMS Directorate coordinates funds obtained from the OBES Division of Materials Sciences and Engineering (DMSE), which total $2.1 million for FY05 (see Table 13). CMS is responsible for executing the majority of the program as well as for reporting, oversight, and review of the entire program.

The LLNL BES/DMSE program objectives are:

- **Materials Engineering Physics—**Explore at the atomistic level the nature of adhesion and bonding in metal/metal and metal/ceramic systems.
- **Condensed Matter Physics and Materials Chemistry**
  - Develop a basic theoretical understanding and predictive simulation capability for microstructural evolution in metals following irradiation.
  - Develop and apply new experimental methods focused on developing a basic understanding of the fundamental properties of reduced-dimensionality condensed matter systems.
  - Develop and apply new experimental techniques focused on developing a basic understanding of nanoscale magnetics in strongly correlated-electron materials.
  - Develop and apply high-performance ab initio quantum-level computational methods to investigate the fundamental properties of nanoscale materials.

LLNL's BES/DMSE program strategies are as follows:

- Develop projects in support of mission needs and objectives to advance the core disciplines of the basic energy sciences for energy independence.
- Develop a close coupling between theoretical and computational predictions and experimental observations.
- Develop an increasing number of collaborations with other BES activities and facilities, as well as academia.

Scientific and Technical Achievements

Table 14 lists some of the CMS Directorate's scientific and technical achievements in our divisions for the 2004 calendar year.

Table 13. CMS FY05 OBES Projects and Budgets

CMS Contact	Project Title	Funding ($K)	Capital ($K)
Materials Science			
G. Campbell	Adhesion and Bonding	381	-
P. Asoka-Kumar	Positron Sciences	32	-
J. Elmer	Welding Metallurgy	147	-
G. Gilmer	Radiation Damage	79	-
V. Bulatov	S&P Microstructural Effects on Mechanisms	73	-
G. Galli Gygi	Semiconductor Nanostructures	422	-
L. Terminello	Advanced Heterointerfaces	343	-
J. Tobin	Nanoscale Materials	395	-
C. Mailhoit	Camera System	-	218
Chemistry and Chemical Engineering			
T. Baumann	S&P Electroactive Polmers Nano Net	19	-
Total CMS OBES		$1,890	$218

Table 14. CMS Scientific and Technical Achievements in 2004

Metric	CBND	MSTD	CChED	**2004**
Major Awards	2	25	4	31
R&D 100 Awards	-	-	-	-
Patent Disclosures	16	6	12	34
Patent Applications	-	5	14	19
Patents Issued	-	5	-	5
Licenses Executed	-	3	-	3
Refereed Publications	93	174	113	380
Invited Presentations (Major Conferences)	16	42	22	80
Contributed Presentations	90	81	125	296
Journal Editorships	-	-	3	3
Conferences Organized	12	5	4	21
Editorial Boards	3	9	1	13
Total CMS Achievements	232	355	298	885

Figure 24. Chemical Biology and Nuclear Science Division Organization

Personnel Relations—B. Lanier
Resource Manager—R. Martin
Division Administrator—B. Royval
BSNL Director (Acting)—J. DeYoreo

IPA Assignments:
NNSA—S. Kreek
DOE—N. Stoyer

Chemical Biology and Nuclear Science

Division Leader—Bryan Bandong (Acting)

Deputy Division Leader, Science and Technology—Robert Maxwell (Acting)
Deputy Division Leader, Radiological Operations—Reggie Gaylord (Acting)
Deputy Division Leader, Chemical Science and Bioanalytical Chemical Operations—Teigh Mitchell-Hall (Acting)
Deputy Division Leader, Safeguards and Security Operations—Wini Parker (Acting)

BSNL Secretary—B. Bollinger
Program Secretary—E. Davis
CAS, Program Secretary—R. Kamerdula
DL & DDL S&T Secretary, Division Secretary, Timekeeper—D. Lindo
GTSI Administrator, Chemical Sci. Admin. Lead—B. McGurn
Nuclear Science Admin. Lead, Program Secretary, DDL Ops. Training Coordinator—C. Napier
BSNL Secretary—K. Thomas
Program Secretary—R. Yamamoto
Program Secretary—B. Zumwalt

Nuclear Science

Associate Division Leaders

Howard Hall and David Smith

Administrative Lead—C. Napier

DNT

Stockpile Radchem
Program Element Leader—J. Kenneally
Deputy Program Element Leaders—
N. Wimer
W. Parker
Administrator—
C. Napier
Y. Dardenne
W. Goishi ▲
J. Landrum ▲
R. Lougheed ▲
K. Moody
N. Namboodiri ▲
J. Patin
K. Roberts
D. Shaughnessy
M. Stoyer
C. Velsko
J. Wild
P. Wilk
T. Wooddy

NAI

Materials Protection, Control, and Accountability and S&S
Program Element Leader—W. Ruhter
Secretary—
R. Yamamoto
Y. Ham
R. Price
J. Swanson

Nuclear Border Security
Program Element Leader—B. Lanier
Secretary—
R. Kamerdula
D. Archer
J. Luke
D. Manatt
D. Trombino

E&E

Highly Enriched Uranium
Program Element Leader—N. Stoyer (Acting)
Secretary—B. Zumwalt
D. Leich
K. Raschke
A. Ruth
M. Serrano de Caro

SEP

Chemical Environmental Services
Program Element Leader—
R. Gaylord
Deputy Program Element Leaders—
T. Mitchell-Hall
C. Moody Bartel
Secretary—B. Zumwalt
C. Bartholdi
N. Briant
L. Brockney
S. Caldeira
I. Chiu
M. Cox
J. Dixon
D. Ernst
J. Fontanilla ▲
K. Harward
S. Letendre
K. Listiyo
D. Montero
N. Philip
T. Prussin
R. Salgado
C. Semuas
J. Shadoin
N. Shen
D. Silberman
P. Torretto
T. Werner
D. Wruck

Scientific Capabilities

Environmental Radiochemistry
Scientific Capability Leader—B. Esser
Deputy Scientific Capability Leader—TBD
Secretary—R. Yamamoto
R. Bibby
W. Culham
G. Eaton
V. Genetti
M. Granillo
E. Guthrie
L. Harris
M. Hu
B. Hudson
J. Moran
E. Ramon
T. Rose
M. Singleton PD #
M. Sutton
S. Szechenyi
A. Volpe
R. Williams
P. Zhao

Radiation Detection
Scientific Capability Leader—T. Wang
Administrator—
R. Yamamoto
D. Beckedahl
L. Dauffy PD
A. Friensehner ▲
D. Gunter
B. Haslett
J. Lehmann #
L. Mihailescu
G. Schmid
K. Vetter #

Chemical Sciences

Associate Division Leader

Robert Maxwell

Administrative Lead—B. McGurn #

NAI

Forensic Chemistry
Program Element Leader—A. Alcaraz (Acting)
Secretary—B. Zumwalt
J. Bazan ▲
M. Chiarappa-Zucca
P. Grant
B. Hart
G. Klunder
C. Koester
P. Nunes
S. Shields
P. Spackman
R. Whipple

Scientific Capabilities

Chemical and Isotopic Signatures
Scientific Capability Leader—I. Hutcheon #
Administrator—B. McGurn#
S. Fallon
M. Kristo
D. Phinney #
C. Ramon
J. Smith PD
P. Weber #

Nuclear Magnetic Resonance
Scientific Capability Leader—R. Maxwell
Secretary—B. Zumwalt
S. Chinn PD
E. Gjersing
J. Herberg PD
A. Paravastu †
A. Tran PD

Nanospectroscopy
Scientific Capability Leader—T. Huser
Secretary—K. Ricard
C. Hollars √
A. Schwartzberg †
C. Talley √

Bioanalytical Chemistry

Associate Division Leader

Ted Tarasow (Acting)

Administrative Lead—K. Thomas

NAI

Aerosol Sciences
Program Element Leader—D. Fergenson (Acting)
Secretary—E. Davis
K. Coffee PD √
G. Czerwieniec †√
S. Russell †√
H. Tobias PD √

Scientific Capabilities

Biorganic Synthesis and Protein Chemistry
Scientific Capability Leader—T. Tarasow
Secretary—E. Davis
J. Camarero LF√
P. Chan
S. Hok PD
R. Kimera PD
Y. Kwon PD √
J. Perkins √
J. Tok√

Physical Biosciences
Scientific Capability Leader—C. Orme
Secretary—K. Thomas
A. Hiddessen PD
C. Jeans PD
T. Laurence PD
N. Shen PD
T. Sulchek PD

Scientific Capabilities

Computational Systems Biology
Scientific Capability Leader—TBD
Secretary—E. Davis
A. Golumbfskie PD

Biomass Spectroscopy
Scientific Capability Leader—H. Benner
Secretary—K. Ricard
C. Bailey √
N. Young √

Biophysical and Interfacial Science
Scientific Capability Leader—C. Orme
Secretary—K. Ricard
A. Artyukhin †
O. Bakajin LF√
J. Bearinger
S. Chung PD
B. Dick PD√
R. Friddle †√
J. Giocondi PD
J. Holt PD
J. Huang PD
S. Letant √
A. Malkin
J. Muyco †
A. Noy √
M. Plomp PD
R. Qiu PD√
T. Ratto PD
M. Staderman PD
J. Tringe

\# GTSI
√ BSNL
LF Lawrence Fellow
PD Postdoc
▲ Retiree/Indeterminate
† Graduate Student

03/07/05

See Acronyms and Abbreviations on page 39 for full spelling of terms.

Figure 25. Chemistry and Chemical Engineering Division Organization

EMC Director—R. Simpson
DoD Technologies—C. Pruneda
Deputy MPL NAI—N. Rosenberg
Deputy MPL E&E—R. Upadhye
ESC Leader—W. McLean
DoD/DOE/MOU PM—B. Watkins

Senior Scientists
J. Britten
T. Parham
C. Thorsness

Chemistry and Chemical Engineering

Division Leader—Randall Simpson
Deputy Division Leader, Science & Technology—Patrick Allen
Deputy Division Leader, Operations—Hugh Gregg

Division Administrator—V. Eiden
Associate Administrator—S. Crowder
Division Administration Support—D.Tanner
Administration Support—S. Stacy
Administration Support—C. McLean √
Administration Support—J.Reyes-Quick SL
Resource Manager—N. Schoendienst

DNT

Energetic Materials

Program Element Leader—J. Maienschein
Associate Administrator—S. Crowder
Administrator—S. Stacy

W. Black
A. Boegel
J. Chandler
M. Coburn *
B. Cunningham
A. Fontes
J. Forbes PG
P. Gallagher
F. Garcia
R. Garza
L. Green ▲
D. Hare
P. Hsu
M. Kumpf
J. Kury ▲
L. Lauderbach
E. Lee ▲
P. Lewis
J. Molitoris
A. Nissen √
K. Pederson
R. Swansiger
T. Tran
H. Turner
P. Urtiew ▲
K. Vandersall
B. Watkins
S. Weber
R. Weese

Weapon Materials Compatibility and Aging

Program Element Leader—B. Balazs
Deputy Program Element Leader—TBD
Administrator—C. McLean

C. Alviso
J. Caruther *
B. Cena
I. Chiu
C. Colmenares PG
C. Harvey
M. Lane
R. McKoon PG
E. Mones
G. Overturf
R. Palicka PG
M. Schildbach
H. Smith *
L. Spellman
S. Steward
A. Vance √
B. Weeks √

* Consultant
\# Foreign National
√ Flex Term
PD Postdoc
PG Participating Guest
▲ Retiree
✦ Temporary
† Indeterminate
SL Supplemental Labor

NIF

NIF Optics

Program Element Leader—P. Whitman
Deputy Program Element Leader—M. Borden
Division Administrator—C. McLean
Program Administrator—M. Antone

L. Auyang
J. Fair
C. Hoaglan
E. Miller
W. Miller ▲
J. Peterson
A. Winter

NIF Target Fabrication

Program Element Leader—R. Wallace
Administrator—C. McLean
Program Administrator—M. Antone

S. Buckley
E. Fearon
S. Letts

NIF Materials

Program Element Leader—P. Hawley-Fedder
Deputy Program Element Leader—C. Choate
Division Administrator—C. McLean
Program Administrator

S. Andersen ✦
A. Clasen
R. Dylla-Spears √
P. Ehrmann
J. Ertel
G. Hampton
T. Land
R. Meissner √
J. Menapace
P. Miller ▲
T. Suratwala
R. Steele
D. Wruck
F. Zaka

NAI

NAI

Program Element Leader—D. Shoemaker
Deputy Program Element Leader—R. Grimm
Administrator—C. McLean

M. Adamson PG
D. Camp
D. Jones
F-M. Kong
H. Mulcahy
C. Olson
M. Riley
H. Saito √
C. Stevens

Summer Students—2004

Administrator—J. Reyes-Quick

F. Gagliardi
D. Murphy
C. Young
C. Cummings
B. Karlo
W. Montgomery

Scientific Capabilities

Extreme Chemistry

Scientific Capability Leader—L. Fried
Deputy Scientific Capability Leader—R. Gee
Associate Administrator—S. Crowder
Administrator—S. Stacy

K. Balasubramanian
J. Bozzelli PG
J. Crowhurst PD #
H. Curran *
K. Frischknecht PG
K. Glaesemann
N. Goldman PD
A. Goncharov
M. Howard
T. Jayaweera PG
D. Majumdar PG #
R. Manaa
M. McClelland
W. Michael PG
A. Nichols
W. Pitz
B. Rambubu
E. Reed PG
C. Souers
C. Tarver
P. Vitello
J. Yoh √
J. Zaug

Computational Chemical Biology

Scientific Capability Leader (Acting)—L. Fried
Deputy Scientific Capability Leader—C. Mundy √
Administrator—C. McLean

I. Kuo PD
C. Melius
J. Quong √
C. Schaldach √
J. Vandersall

Advanced Material Synthesis

Scientific Capability Leader—J. Satcher
Deputy Scientific Capability Leader—P. Pagoria
Administrator—C. McLean

T. Baumann
L. Carman
B. Clapsaddle PD
P. Coronado
K. Foster
S. Gammon √
A. Gash
M. Hoffman
L. Hrubesh ▲
S. Hulsey †
R. Landingham PG
K. Langry
R. Madabhushi
A. Mitchell
J. Poco
R. Reibold
B. Sanner
R. Schmidt
T. Tillotson

See Acronyms and Abbreviations on page 39 for full spelling of terms.

Figure 26. Materials Science and Technology Division Organization

Senior Scientists/Secretaries and Administrators
Computational Materials—A. Farid/L. Jones
B. Wolfer/K. McWilliams
Multilayer Materials—T. Barbee/K. Silva
Materials Mechanics—D. Christensen/S. Mathews
Energy Technologies—J. Cooper/S. Mathews
Materials Integration Manager—B. Gourdin (Program Support)
Metallurgy—T. G. Nich/K. Silva
Nuclear Technologies—Frank Wong/J. Maxwell

Materials Science and Technology Division

Division Leader—Christian Mailhiot
Deputy Division Leader, Science and Technology—Wayne King
Deputy Division Leader, Operations—Tammy Gdowski
Associate Division Leader, Dynamic Experiments—Kimberly Budil

Resource Manager—C. Schoendienst
Administrator—J. Marden
Associate Administrator—K. Gonzales

Administrative Staff
M. Aikman-Pacheco
B. Browning
L. Jones
J. Maxwell
K. McWilliams
M. Salas
K. Silva

Stockpile Science

DNT
Materials Science of Strongly Driven Systems

Plutonium Science and Technology
Program Element Leader—B. Ebbinghaus
Deputy Program Element Leader—Mike Blau (Acting)
Secretary—S. Matthews
B. Chung
P. Curtis
R. Erler
J. Estill
K. Grant
L. Gray
J. Lawson
D. McAvoy
H. Olson
D. Pugh
T. Quick
M. Sharp
J. Stanford
S. Thompson
M. West

Joining
Deputy Program Element Leader—J. Elmer
Secretary—M. Salas
M. Gauthier
T. Palmer
R. Pong

Plutonium Chemical Processing
Program Element Leader—K. Dodson
Deputy Program Element Leader—J. Burch
Secretary—J. Kelley
D. Bajao
A. Goins
M. Harland
L. Hunt
R. Klatt
O. Krikorian
J. McNeese
D. Mew
J. Schmitz
R. Torres

Stockpile Metallurgy and Joining
Program Element Leader—L. Summers (Acting)
Deputy Program Element Leader—T. Sun (Acting)
Secretary—M. Salas
O. Cervantes
B. Choi
R. Condit #
D. Del Giudice
L. Hsiung
R. Krueger
R. Randich
T. Shen

DNT/NIF
High-Energy-Density Materials Science

NIF Materials Integration
B. Gourdin

ICF/Weapons Physics Targets
Program Element Leader—R. Wallace
Secretary—K. Silva
C. Alford
J. Gunther
M. Shirk

Scientific Capabilities

Correlated-Electron Systems and Alloy Properties
Scientific Capability Leader—T. Felter
Deputy Scientific Program Leader—J. Tobin
Secretary—B. Browning
D. Benoit
K. Blobaum
M. Butterfield
D. Clatterbuck PD
L. Dinh
S. McCall PD
K. Moore
W. Siekhaus
M. Stratman
T. Trelenberg PD
J. Wong
S. Yu

Ultrafast Materials Science
Scientific Capability Leader—W. King (Acting)
Secretary—B. Browning
M. Armstrong
M. Barney *
G. Campbell
J. Colvin
M. Kumar
T. Lagrange
J. McNaney
L. Nguyen
B. Reed PD
B. Torralva

Target Science

NAI

Advanced Materials and Characterization
Program Element Leader—A. Jankowski
Secretary—K. Silva
K. Bettencourt
N. Cherepy
P. Mirkarimi
C. Walton

Scientific Capabilities

Nanoscale Materials Science and Technology
Scientific Capability Leader—A. Hamza (Acting)
Secretary—K. Silva
T. Barbee
J. Biener
S. Demos
J. Hayes
A. Hodge
S. Kucheyev LF
R. Meulenberg
R. Negres
J. Nilssom
J. Silveira
T. van Buuren
Y. Wang
T. Wiley *

Energy and Environment

E&E

Nuclear Materials Stewardship
Program Element Leader—G. Gdowski (Acting)
Deputy Program Element Leader—TBD
Secretary—J. Maxwell
D. Day
L. DeLoach
B. El-Dasher PD
K. Evans
J. Gray PD
J. Haslam
G. Hust
G. Ilevbare
K. King
T. Lian
A. Lingefelter #
R. Rebak
K. Staggs
S. Torres

Cross-Cutting Scientific Capabilities

High-Performance Computational Materials Science and Chemistry
Scientific Capability Leader—T. Arsenlis (Acting)
Deputy Scientific Capability Leader—TBD
Secretary—L. Jones, S. Payne
E. Bringa
A. Caro
M. Caturla
T. Gonis
G. Gilmer
M. Hiratani PD
K. Kim
A. Kubota
C. Maloney *
J. Marian
T. Oppelstrup √
B. Sadigh
M. Surh
P. Turchi
S. Yalisove
L. Zepeda-Ruiz PD

Materials Synthesis and Nanobeam Precision Characterization
Scientific Capability Leader—A. Nelson
Deputy Scientific Capability Leader—M. Wall
Secretary—J. Maxwell
A. Bliss
Z. Dai
C. Evans
J. Ferreira
J. Go
J. Harper
V. Mason-Reed
W. Moberlychan
E. Nelson
C. Saw
E. Sedillo
N. Teslich
B. Vallier
J. Welch SL
K. Wu

PD Postdoc
LF Lawrence Fellow
* SEGRF
\# Fixed Term Retiree
√ Grad Student Term
SL Supplemental Labor

See Acronyms and Abbreviations on page 39 for full spelling of terms.

Figure 27. CMS Finance and Facilities Office Organization

Operations Analysis—Laura Dixon SL **Administrator—**Barbara Jackson	**Chief Financial Officer/Facilities Director** Al Moser	**Deputy Institutional Facilities Manager—**Carey Bailey* **Building 332 Facility Manager—** Roger Rocha*
Business Operations	**Site 200 Facility Operations**	**Site 300 Facility Operations**
Business Manager—E. Waller *Administrator—Y. Villa* **Resource Managers** CChED/Instutional—N. Edney CBND,GTSI, BSNL—TBD MSTD, MCAP, IGPE—C. Schoendienst Operations—Theresa Healy RM Team Support—C. Michelsen **Publications, Application, and Web Services** Supervisor—Theresa Healy S. Beall S. Dougherty* M. Emig A. Francke G. Hazelhofer* K. Rath (50%)* S. Shang **Technical Release Representatives** K. Boyden* E. Kelly* M. McCarra* E. Mones M. Prusse M. Ross (50%)* **Property** A. Whitacre SL D. Quigley * Matrixed to Operations SL Supplemental Labor	**AD Facility Manager, Site 200—**G. Cooper **Deputy AD Facility Manager**—TBD *Administrator—P. Brooks* **Facility Points of Contact (FPOCs)** B133, B151, B152, B154—G. Cooper B132N, B235, B241—F. Beckett B155, T1541, T1927, T1602—D. Higby* T2425, T2428, T2475—J. Marks* **Alternate FPOCs** B151, B152, B154—D. Higby* B241—J. Kilmer* B235—J. Marks* **Labor Services** G. Brettelle SL D. Hornett SL R. Ramirez SL J. Warren SL **Project Management** D. Sprayberry*	**FPOC—**J. Scott *Administrative Support—R. Dominiak* **Alternate FPOCs** B809, B810, B817, B845—D. Adams* B825, B826, B827—W. Black* B816—P. Gallagher* B823—K. Morales* B805, B806, B807—D. Zevely*

See Acronyms and Abbreviations on page 39 for full spelling of terms.

Acronyms and Abbreviations

Acronyms

AA	associate in arts
AD	Associate Director
ASC	Advanced Simulation and Computing
AHRD	Administration and Human Resources Directorate
B	building
BBRP	Biology and Biotechnology Research Program
BES	Basic Energy Sciences
BS	bachelor of science
BSNL	BioSecurity and Nanosciences Laboratory
CAS	classified administrative specialist
CBND	Chemical Biology and Nuclear Science Division
CChED	Chemistry and Chemical Engineering Division
CMS	Chemistry and Materials Science
CREM	Classified Removable Electronic Media
DL	division leader
DDL	deputy division leader
DMSE	Division of Materials Science and Engineering
DNT	Defense and Nuclear Technologies
DoD	Department of Defense
DOE	Department of Energy
E&E	Energy and Environment
ERD	Exploratory Research in the Disciplines
ESC	Enhanced Surveillance Campaign
ES&H	environment, safety, and health
FSC	Forensic Science Center
FTE	full-time equivalent
FY	fiscal year
G&A	general and administrative
GTSI	Glenn T. Seaborg Institute of Transactinium Science
HVAC	heating, ventilation, and air conditioning
HWM	hazardous waste management
ICF	Inertial Confinement Fusion
IFM	Institutional Facilities Manager
IGPE	institutional general-purpose equipment
IPA	Intergovernmental Personnel Act
ISMS	Integrated Safety Management System
ISSM	Integrated Safeguards and Security Management
ITS	Issues Tracking System
LDRD	Laboratory-Directed Research and Development
LF	Lawrence Fellow
LLNL	Lawrence Livermore National Laboratory
LSD	Laboratory Services Directorate
LW	Laboratory-Wide Competition
MCAP	Materials Computation, Analysis, and Processing
MOU	memorandum of understanding
MPL	materials program leader
MS	master of science
MSTD	Materials Science and Technology Division
NAI	Nonproliferation, Arms Control, and International Security
NanoBIS	Nano Bremstrahlung Isochromat Spectroscopy
NARAC	National Atmospheric Release Advisory Capability
NIF	National Ignition Facility
NNSA	National Nuclear Security Administration
NSCL	Nanoscience and Characterization Laboratory
OBES	Office of Basic Energy Sciences
OFC	organizational facility charge
OJT	on-the-job training
OPC	organizational personnel charge
PAT	Physics and Advanced Technologies
PC	personal computer
PD	postdoc
PG	participating guest
PhD	doctor of philosophy
PM	project manager
PMC	program management charge
R&D	research and development
RRP	room responsible person
S&S	Safeguards and Security
S&T	science and technology

Continued on page 40 ➤

Acronyms and Abbreviations
Continued from page 39

SEP	Safety and Environmental Protection
SEGRF	Student Employee Graduate Research Fellowship
SEP	Safety and Environmental Protection
SI	Strategic Initiative
SL	supplemental labor
T	trailer
TBD	to be determined
TRR	technical release representative
UC	University of California

Abbreviations

$K	thousands of dollars
$M	millions of dollars
admin.	administrative
B132N	Building 132 North
B133	Building 133
B151	Building 151
B152	Building 152
B154	Building 154
B155	Building 155
B232	Building 232
B235	Building 235
B241	Building 241
B242	Building 242
Comp.	Computation
Eng.	Engineering
Ops.	operations
T1541	Trailer 1541
T1602	Trailer 1602
T1927	Trailer 1927
T2425	Trailer 2425
T2428	Trailer 2428
T2475	Trailer 2475